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3D WORLD

presents

Glen Southern

This issue's cover and the feature it spotlights gave Glen Southern the chance to indulge in one of his greatest passions. "My first love is modelling creatures and characters, although I'm equally happy turning to pencil and paper to get my ideas down. The great thing is that I get to do just that every day."

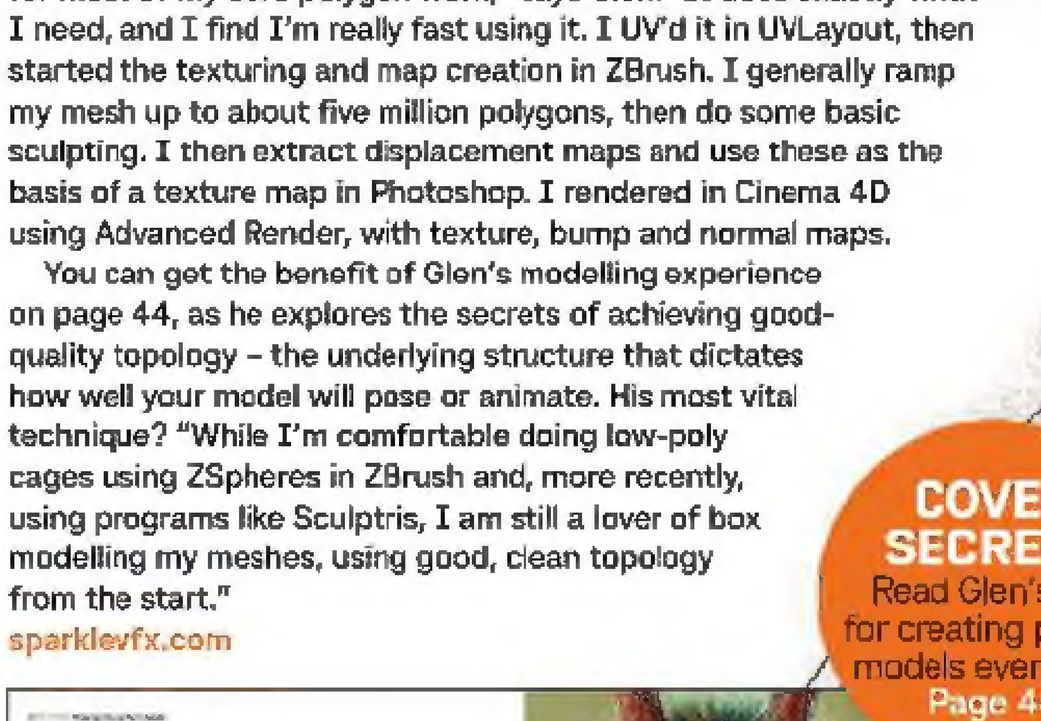
Glen is creative director at SparkleVFX in Liverpool, where he's a partner alongside Glenn Maguire. "We've had some fantastic jobs this year," says Glen, "ranging from working with Sky Creative to doing the VFX and animations on a Beatles immersive for the Museum of Liverpool."

Our cover star is a demon who started life in Silo. "I still use Silo for most of my core polygon work," says Glen. "It does exactly what I need, and I find I'm really fast using it. I UV'd it in UVLayout, then started the texturing and map creation in ZBrush. I generally ramp my mesh up to about five million polygons, then do some basic sculpting. I then extract displacement maps and use these as the basis of a texture map in Photoshop. I rendered in Cinema 4D using Advanced Render, with texture, bump and normal maps.

You can get the benefit of Glen's modelling experience on page 44, as he explores the secrets of achieving good-quality topology – the underlying structure that dictates how well your model will pose or animate. His most vital technique? "While I'm comfortable doing low-poly cages using ZSpheres in ZBrush and, more recently, using programs like Sculptris, I am still a lover of box modelling my meshes, using good, clean topology from the start."

sparklevfx.com

COVER SECRETS
Read Glen's tips for creating perfect models every time
Page 44



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Welcome to 3D WORLD

Are kid-friendly, stereoscopic CG movies still a recipe for success?



Industry watchers will have already heard of the dismal showing of Disney's Mars Needs Moms at the box office, but in case this piece of industry schadenfreude has passed you by, allow me to elucidate. As I write, the Robert Zemeckis-produced CG feature has yet to open in the UK, but it's doubtful that the European market is going to fill the accounting void between its $150 million budget and theatrical takings, which currently stand at a paltry $20 million domestic, $15 million foreign. This box-office tanking – which overtakes Pluto Nash to take third place in the list of biggest cinema flops of all time – will no doubt send ripples through the industry. (Although, as with Disney's canning of Zemeckis' planned remake of Yellow Submarine, it's not necessarily all bad news.)

Mars Needs Moms had a decent pedigree and also embraced the Hollywood holy trinity of CG animation, stereoscopic 3D and family demographic. So just add a veneer of contemporary pop culture (the kid references Wii! The aliens have dreadlocks!), and watch the cash roll in.

No magic bullet

But it seems the average movie-going family is tired of paying top dollar to watch otherwise ordinary films with glasses on. Or tired of hyper-kinetic CG that makes your head hurt. Or tired of Zemeckis and his 'creepy' mocapped inhabitants of the Uncanny Valley. And probably all three.

To be honest, it's a welcome wake-up call that CG in and of itself isn't a ticket to box-office success; because the rate at which CG-animated movies is being pumped out is both extraordinary and disheartening (139 worldwide to date, with 26 in production for 2011/2012 already).

But one thing that really bemuses me is the stratospheric budgets. Okay, Toy Story 3 had a reported budget of $200 million, but is painstakingly hand-crafted a frame at a time by an army of animators, with a much-loved franchise shoring up the investment. But when the majority of your movie is mocapped, even accounting for clean-up, where the hell does upwards of $150 million go? It's only 88 minutes long, which at $1.7 million a minute is more than Avatar! Hopefully, this issue is a better use of your time.

Steve Jarratt, editor

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Each issue, our panel of leading figures from across the CG industry give us their advice and help

Meet all of our advisory board members at 3dworldmag.com/board

Spotlight on...



Lee Danskin
TRAINING DEVELOPMENT DIRECTOR, ESCAPE STUDIOS

Lee Danskin started his career at Alias Research, going on to become part of the development team for Maya 1.0. In 1995, he co-founded London effects house Smoke & Mirrors, working on the title sequence for The World is not Enough before becoming deputy head of 3D at MPC. In 2006, he joined leading international 3D training company Escape Studios, and was voted an Autodesk Maya Masters in 2007. On page 34, Lee joins a powerhouse panel helping you turn an ordinary showreel into one that will get you noticed – and hired.

Tim Alexander
VFX supervisor, ILM

Stuart Adcock
Technical art director, Ninja Theory

Jordi Barés
Joint head of 3D, The Mill

Pascal Blanché
Senior artist, Frontier Developments

Tim Brade
Technical director, Aardman Animations

Rob Bredow
CTO, Sony Pictures Imageworks

Gustavo Capote
Art director, Neoscape

Andrew Daffy
Director, The House of Curves

Lee Danskin
Training development director, Escape Studios

Jonathan Davies
Head of 3D production, The Moving Picture Company

Sofronis Efstathiou
MA 3D programme leader, National Centre for Computer Animation, Bournemouth University

Paul Franklin
VFX supervisor, Double Negative

Andrew Gordon
Animator, Pixar

Eddie Leon
President/CEO, Spine3D

Andrew Lindsay
Director of animation, Lionhead Studios

Stefan Marjoram
Director, Aardman Animations

Jeremy Moorshead
Animation department chair, SCAD

Alex Morris
Founder, Alex Morris Visualisation

Ximo Peris
Creative director, Crystal CG

Shelley Page
Head of International Outreach, DreamWorks Animation

Robi Roncarelli
Editor and publisher, PIXEL

Jolyon Webb
R&D art director, Blitz Games Studios

This issue's contributors



Glen Southern
CREATIVE DIRECTOR, SPARKLE VFX

Glen is a long-time CG artist and sculptor with many training DVDs under his belt. This month, he provides the expertise behind both our cover star and the organic modelling feature on page 44.



Florian Koebisch
TECHNICAL DIRECTOR, PICTORION DAS WERK

As a NextLimit-certified RealFlow expert, Florian was the ideal person to deliver our tutorial on creating crashing waves. Turn to page 62 for his detailed step-by-step walkthrough, and catch his videos on the 3D World website.



Phil Nolan
FREELANCE ARTIST

Phil works mostly in television, commercials and corporate videos. As a key member of the 3D-Coat forum, he brings his substantial knowledge to bear in his tutorial on hard-surface sculpting on page 68.



Scott Spencer
DIGITAL SCULPTOR AND DESIGNER, WETA WORKSHOP

Despite a busy workload that includes best-selling books on ZBrush and working on The Hobbit, Scott still had time to provide his expert advice on texture painting. His article appears on page 74.



Michael McCarthy
ANIMATION INSTRUCTOR, THE NEW ENGLAND INSTITUTE OF ART

Michael McCarthy is a Boston-based 3D artist working in broadcast, feature film and games. He's held classes at SIGGRAPH 2010 and EUE 2010, and his Fundamentals series on lighting continues on page 81.

3D WORLD

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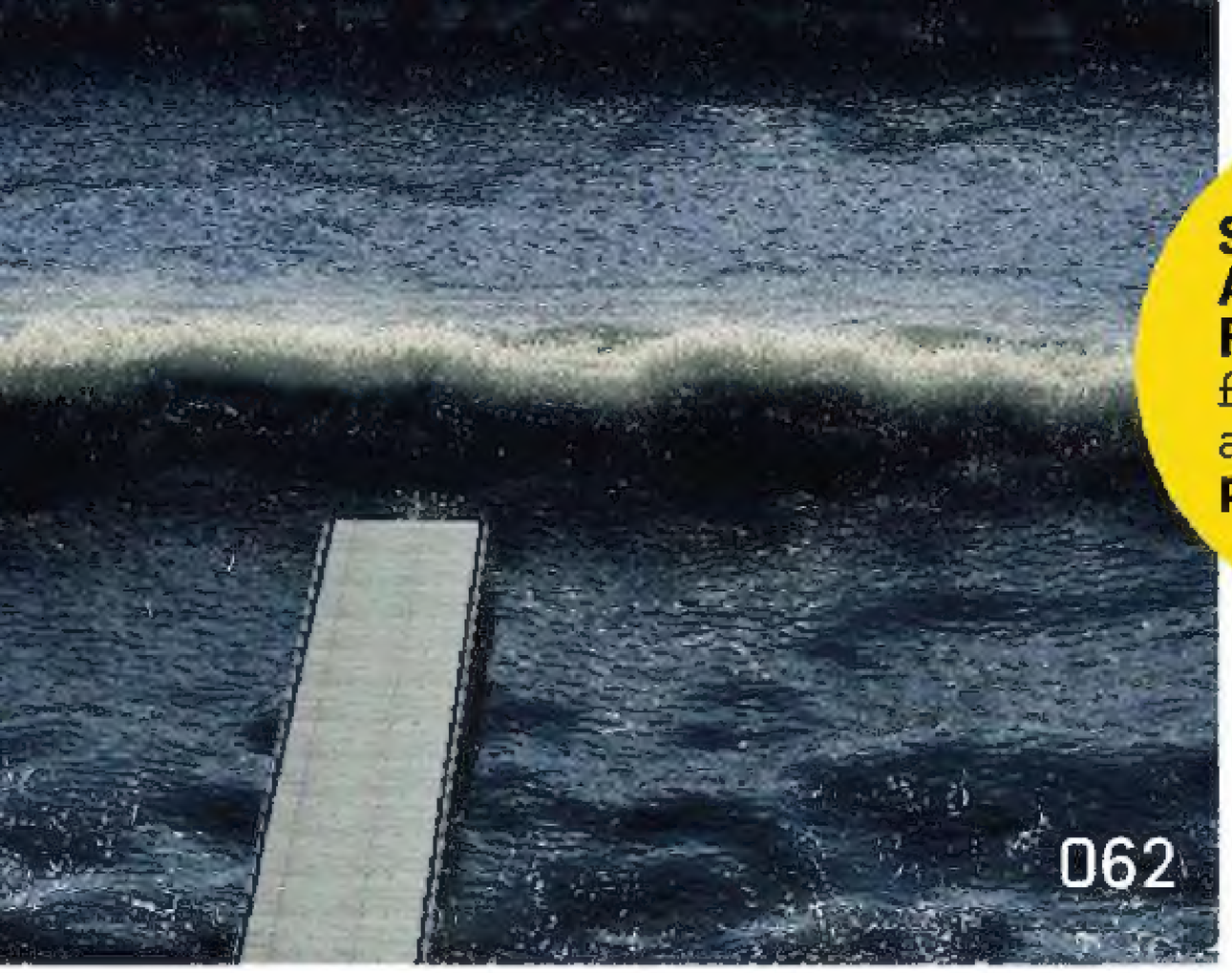
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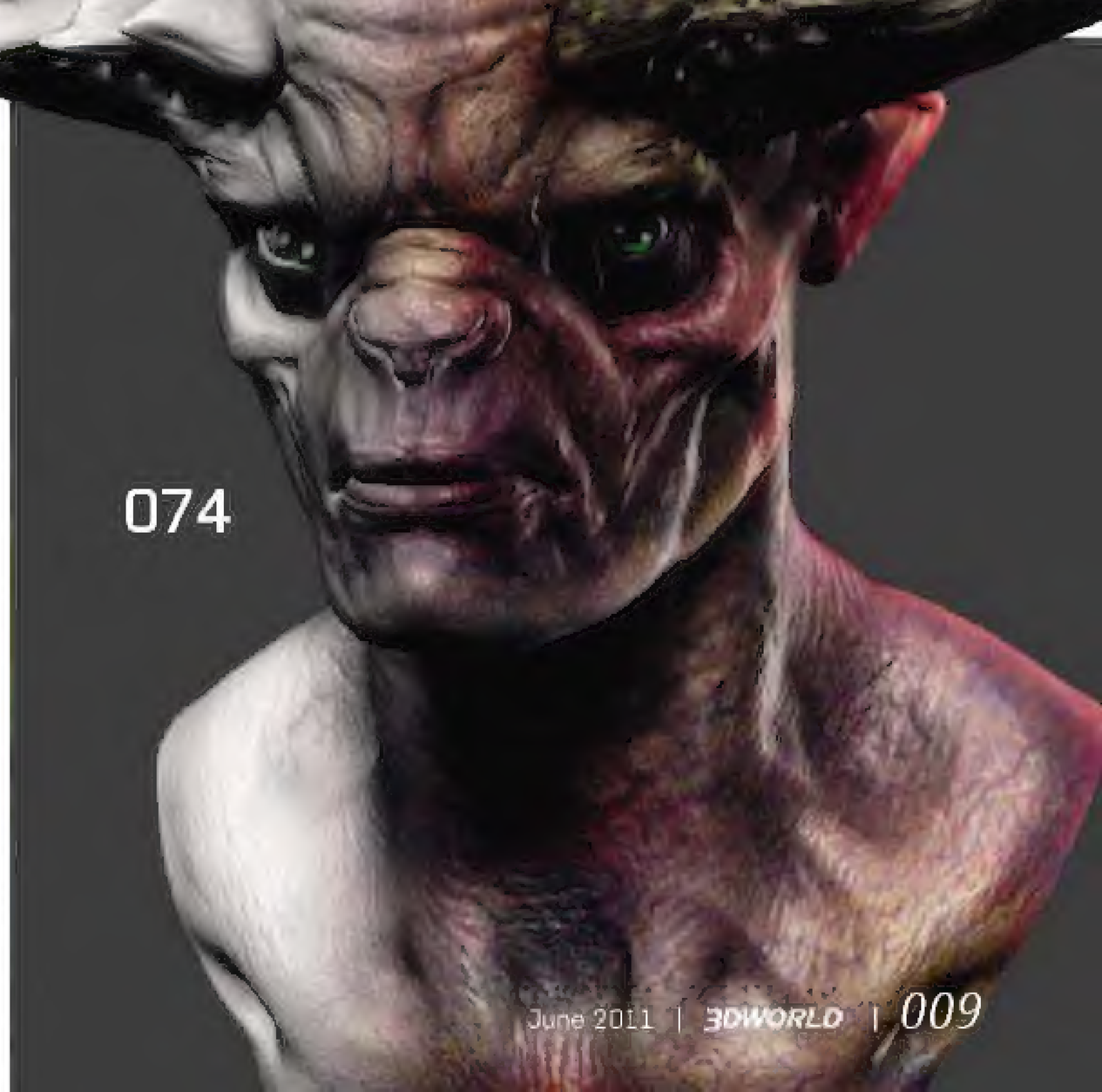


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Artist: Etienne Jabbour
Title: Qav
Software: ZBrush, Mudbox, 3ds Max, mental ray
"I'm an art director at Side, a specialist CG character studio in London. This character is the basis of our ongoing R&D into HD model and texture creation. We worked with 15 4K texture pages, each including diffuse, displacement, specular and reflectivity maps, ptexpacks for metal, wear and so on.

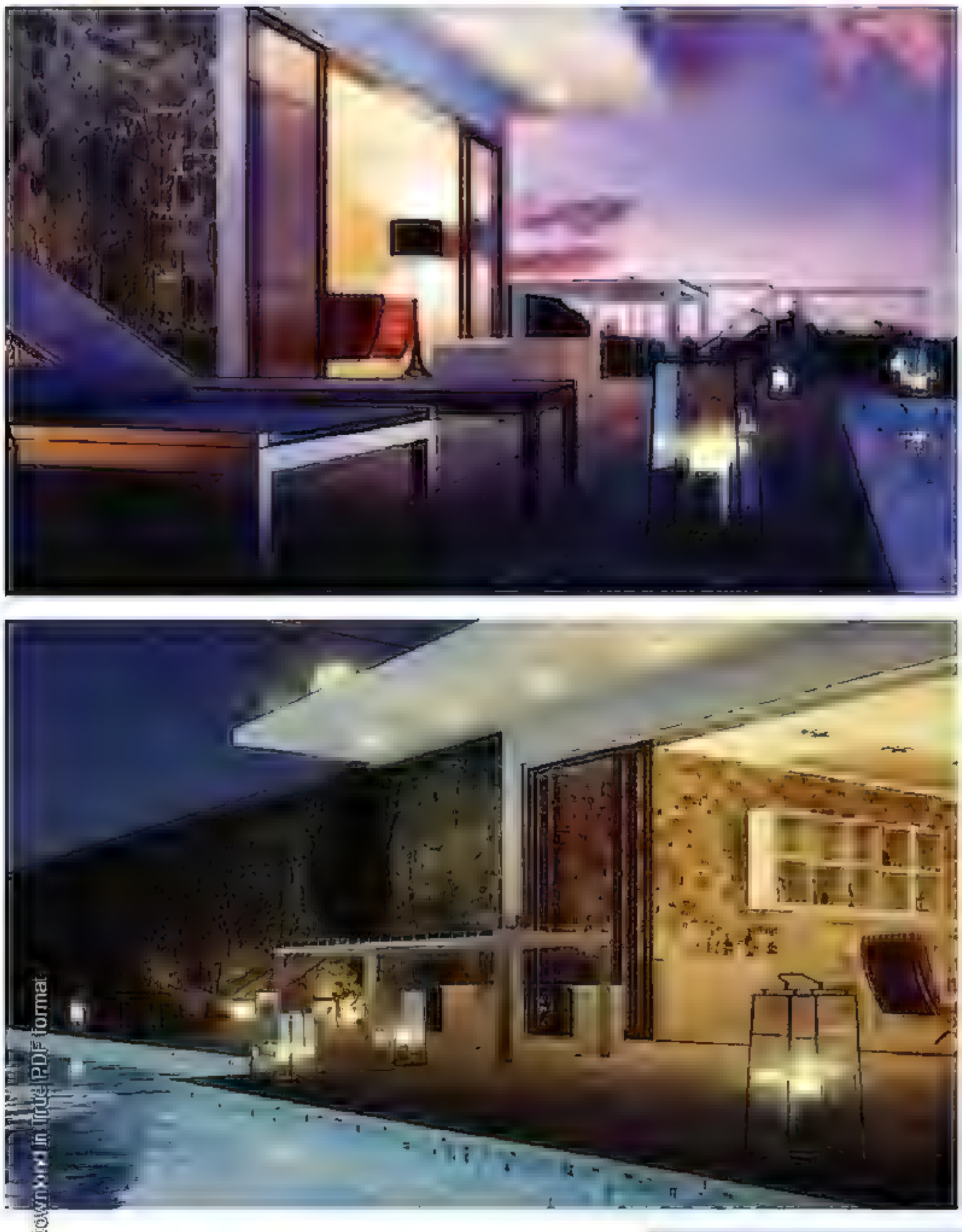
"It meant UVs that were manageable and [illegible] across multiple texture pages. Many parts of the shader [illegible] by composite textures. We blended base shaders with single surface properties (such as cloth or brushed metal) using greyscale masks, keeping the majority of tweaking required to editing greyscale images.

"Bringing it all together, including hand-painted elements such as the smoke, is always fun. You're cast any technical difficulties at that stage and can [illegible] on look and feel. The image itself took [illegible]"

Portfolio

This month's selection of new 3D artwork showcases styles from austere arch-viz to chilling science fiction

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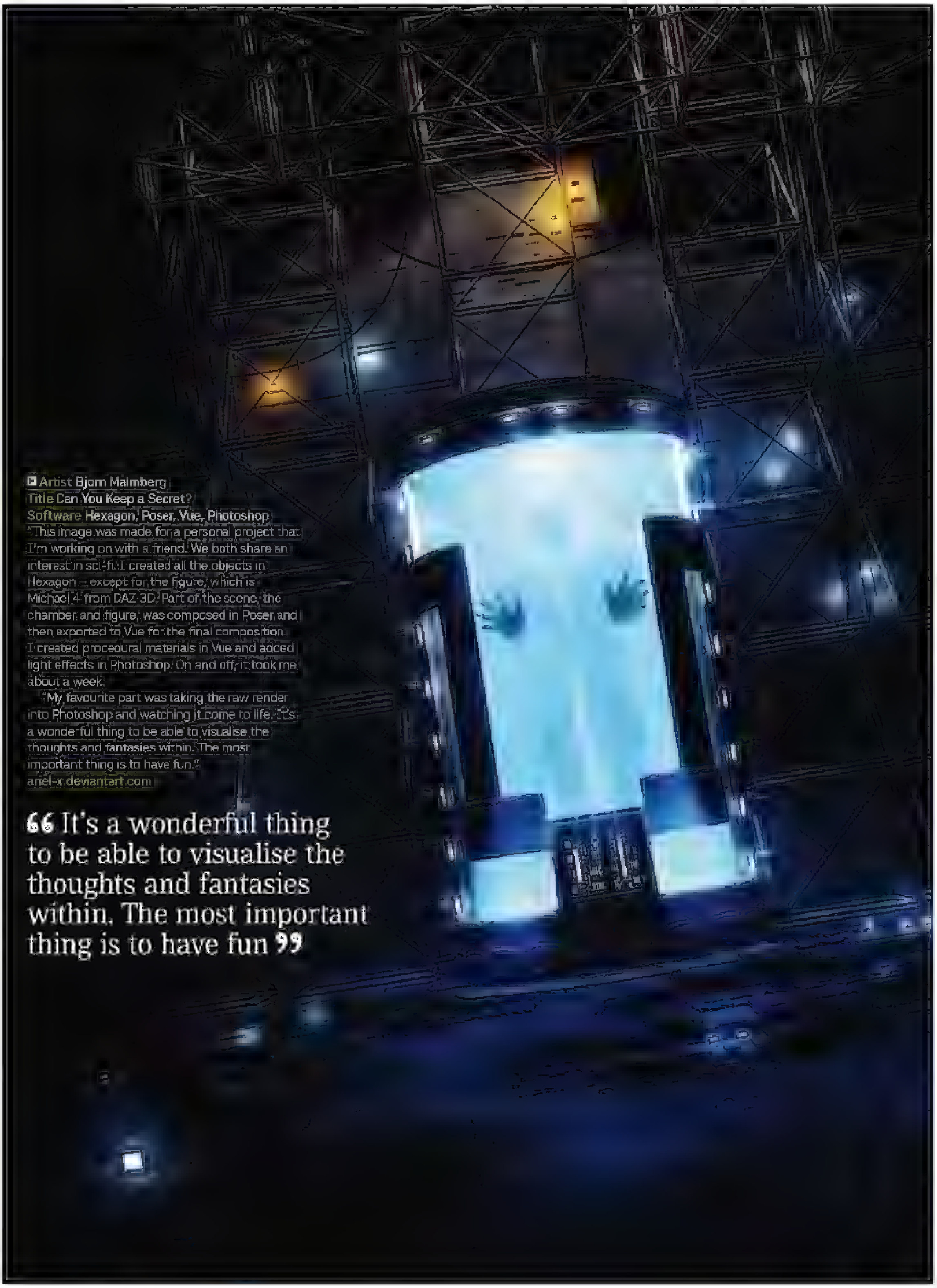
Artist Patric Verstraete
K House
3ds Max, V-Ray, Photoshop

"I did this project in my spare time over two months as an exercise to improve my exterior visualisation skills. As I have an architectural background, the most exciting part was modelling the concept. I enjoyed searching for a good point of view, and from that point looking for a good composition.

"I used the Brix plug-in and Advanced Painter, plus some small scripts like Floor Generator. Some textures came from Arroway and CG Textures, while furniture came from CG Workshop and Colect.

"I'm inspired by observing things around me: visiting museums, studying art, or simply during daily walks with my wife and my dog."

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Artist Bjorn Malmberg
Title Can You Keep a Secret?
Software Hexagon, Poser, Vue, Photoshop

"This image was made for a personal project that I'm working on with a friend. We both share an interest in sci-fi. I created all the objects in Hexagon – except for the figure, which is Michael 4 from DAZ 3D. Part of the scene, the chamber and figure, was composed in Poser and then exported to Vue for the final composition. I created procedural materials in Vue and added light effects in Photoshop. On and off, it took me about a week.

"My favourite part was taking the raw render into Photoshop and watching it come to life. It's a wonderful thing to be able to visualise the thoughts and fantasies within. The most important thing is to have fun."

anel-x.deviantart.com

> "It's a wonderful thing to be able to visualise the thoughts and fantasies within. The most important thing is to have fun"



Artist U-Ri So
U-Ri Portrait
ZBrush, 3ds Max, mental ray, Photoshop

"I'm a freelance 3D character artist. I've been doing characters for Xbox 360 and PC MMORPG games since 2005. In my spare time I work on album covers and both 2D and 3D illustrations.

"I wanted to express a sad smile when I made this. It took about a month and a half."

U-Ri So wins a copy of Poser Pro 2010, worth $499. Linking pro production tools and ready-to-use 3D assets, Poser Pro saves development time and resources.

SmithMicro

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Artist **Simon Williamson**

MM2 Neptune: Micro-Submersible in Hangar

Software **Rhino, KeyShot, Photoshop**

"I'm a professor of industrial design at a college in Boston, and a practising industrial designer. I have dabbled in SolidWorks, really dabbled in Maya and super-dabbled in modo. My experience is in using 3D data for rapid prototyping.

"I like to create somewhat fantasy-based vehicles or vessels that appear to be fairly convincing in terms of the feasibility. This model flowed well from the concept of the sub through to the environment. It was tough to stop fiddling with the details. The image took in the region of 40 hours to make.

"I enjoy being connected, observing, appreciating and studying the range and quality of ideas and work that's being produced all over the world – and figuring out what excites and engages people."

> ❝ This model flowed well from the concept of the sub through to the environment. It was tough to stop fiddling with the details ❞

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Portfolio: In focus

Discover how Ioannis Karathomas created his beautifully detailed homage to the Mobile Suit Gundam universe



Artist **Ioannis Karathomas**
Title **NZ-666 Kshatriya**
Software **Maya, ZBrush, Photoshop**

"This is a piece of fan artwork inspired by the Gundam universe. In my mind, I knew that I wanted to create a cool, realistic mech. But since I didn't know how it was going to look in the end, I decided to build every little detail. The problem was that it took me longer to finish modelling, and I ended up having huge scene files that were crashing my computer when I was trying to render

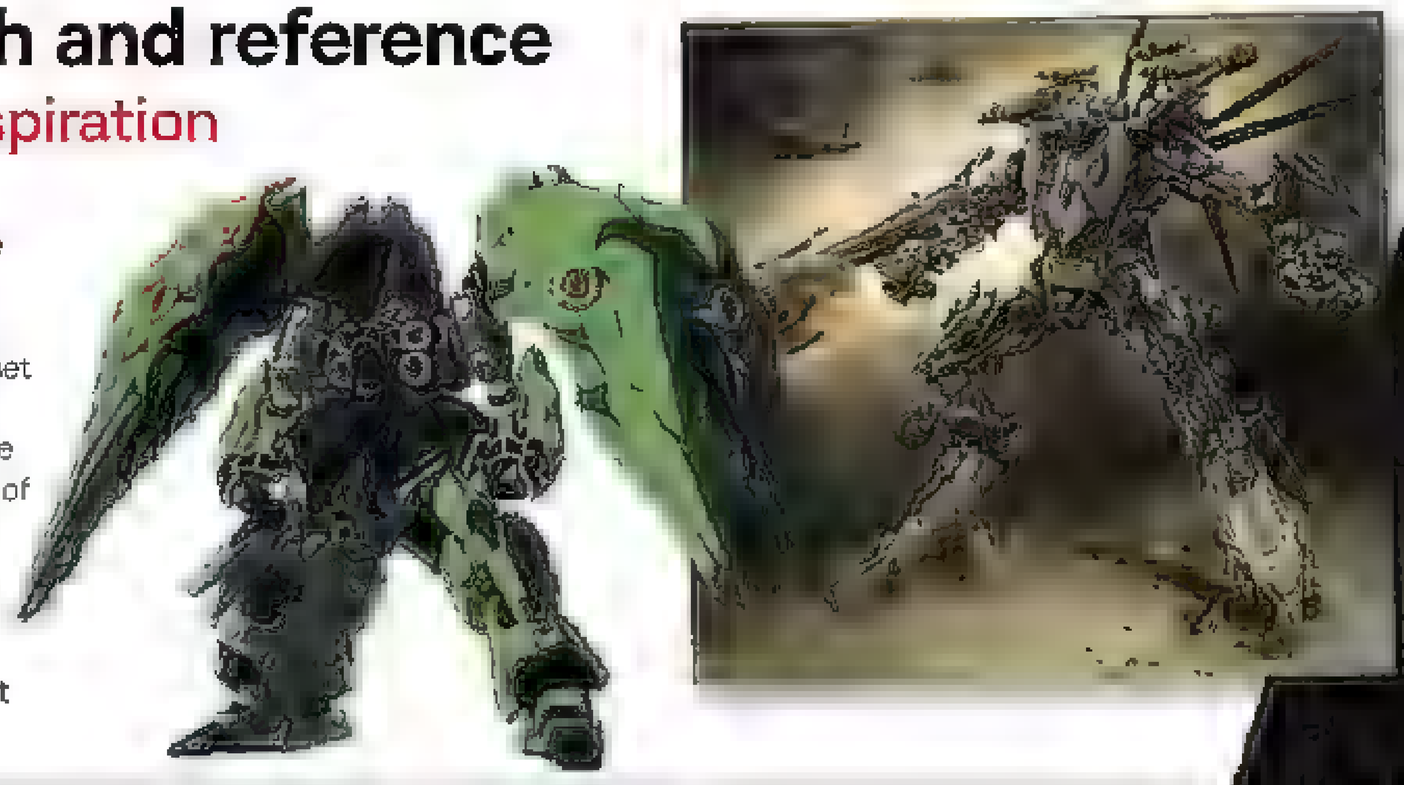
"To overcome this, I thought it would be more beneficial to sculpt some of the mech details instead of building them to save geometry. I also used the decimation tool in ZBrush to make my scenes lighter and I rendered passes for the wings and legs, then comped them together in Photoshop.

"The part that I enjoyed the most was the sculpting and texturing. After spending so much time trying to make an interesting silhouette, sculpting scratches and damaged metal was really relaxing. And when I finally added the textures, it felt that I was giving life to my model."

Ioannis Karathomas
karathomas.com

Research and reference

Gaining inspiration



01 Reference
Since it was Gundam fan art, I did research on the internet and found various photos from the anime series. I also got a lot of inspiration from Josh Nizzi's artwork

Ioanni's piece is derived from different styles of mech



02 Base mesh
I spent lot of time box modelling in Maya in order to build a strong, detailed base mesh before I began to sculpt

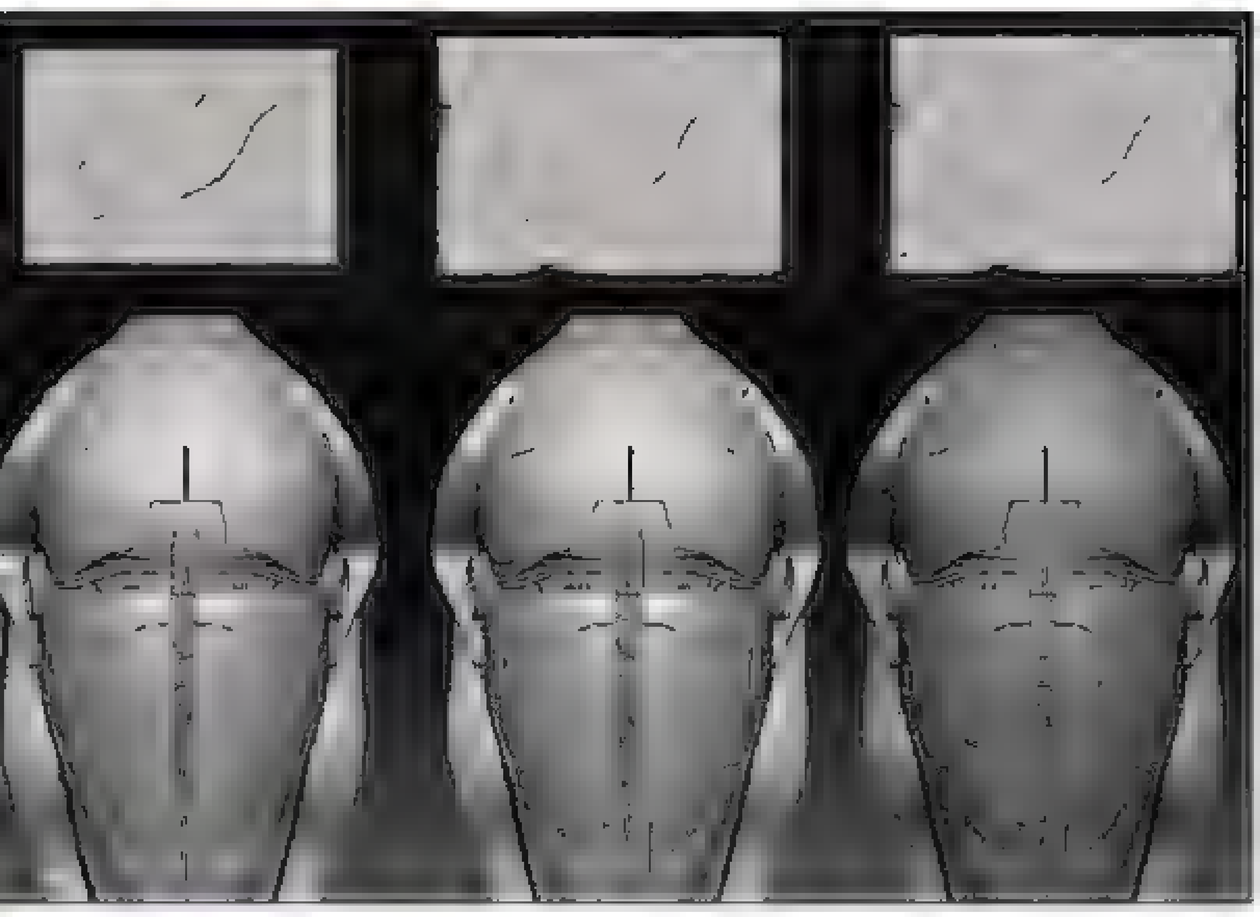
The base mesh was already very detailed, before sculpting began

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Scrollpainting scratchers and damaged metal was really relaxing. And when I finally



03 Metal wear and tear

After I finished the base mesh, I start sculpting scratches, beaten up metal mech parts and bolts. To do this, I save a morph target and, using the Standard brush, start creating the scratches.

Afterwards, I get the Pinch brush and start pinching the edges. As soon I finish, I select a Polish brush and start damaging the surface and the edges to make it look like beaten metal.



04 Final sculpting

I apply this same technique on the rest of the model. Then, for the final pass, I use alphas to draw nuts and bolts and additional surface details. After I've finished sculpting, I collapse the subtools together – like the arm, leg and body – and pose my model.



05 Materials and passes

After I'd finished the modelling and sculpting, I had to decide how to render my work. In the end, I used the approach that I learned by watching Gnomon Workshop tutorials. I added materials and rendered each pass in ZBrush.

The most important materials for me were the FlatSketch material, which I used to fake cavity maps, and the DarkenEdge material for specular highlights. These are the passes I used...

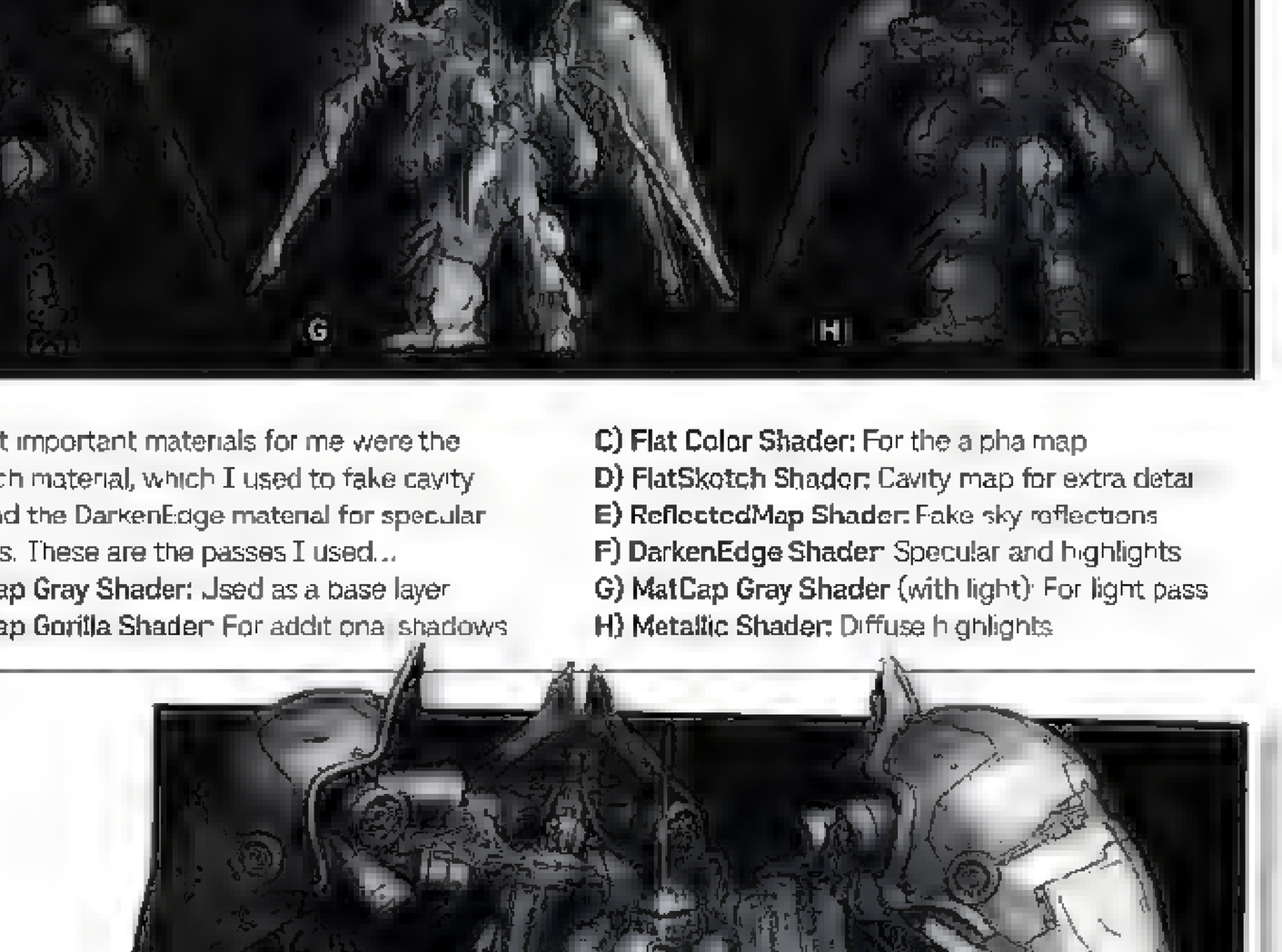
A) MatCap Gray Shader: Used as a base layer
B) MatCap Gorilla Shader: For additional shadows
C) Flat Color Shader: For the alpha map
D) FlatSkotch Shader: Cavity map for extra detail
E) ReflectedMap Shader: Fake sky reflections
F) DarkenEdge Shader: Specular and highlights
G) MatCap Gray Shader (with light): For light pass
H) Metallic Shader: Diffuse highlights

Compositing

Piecing it all together

06 Photoshop comp

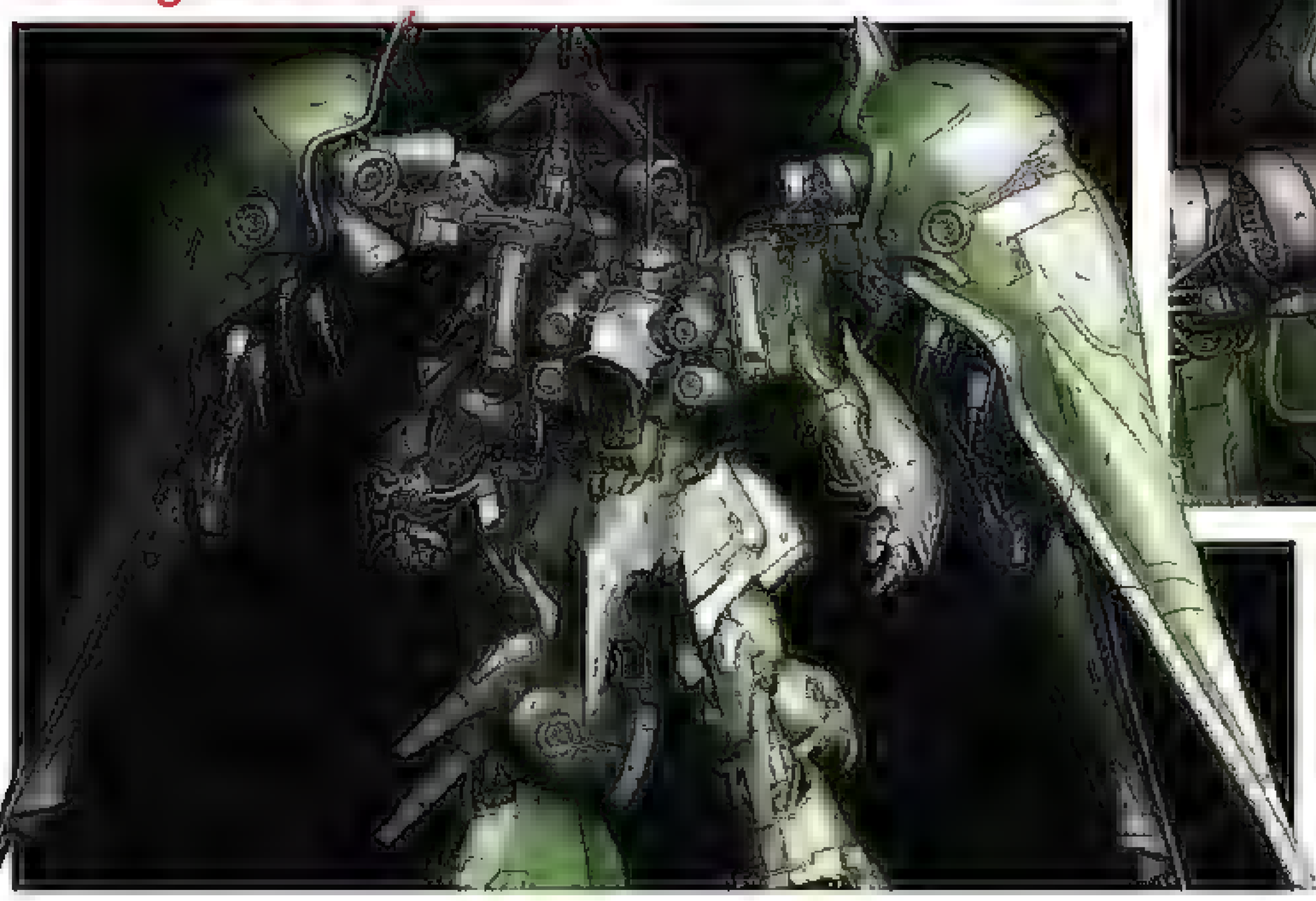
The way I approach the composition is simple. I start with the MatCap Gray render, then Difference the MatCap Gorilla render over the top. I Multiply my cavity map with Opacity adjustments, Screen my specular map and Color Dodge my light pass render. As soon I had finished my layered composite, I had a nice image with which to start my texturing.

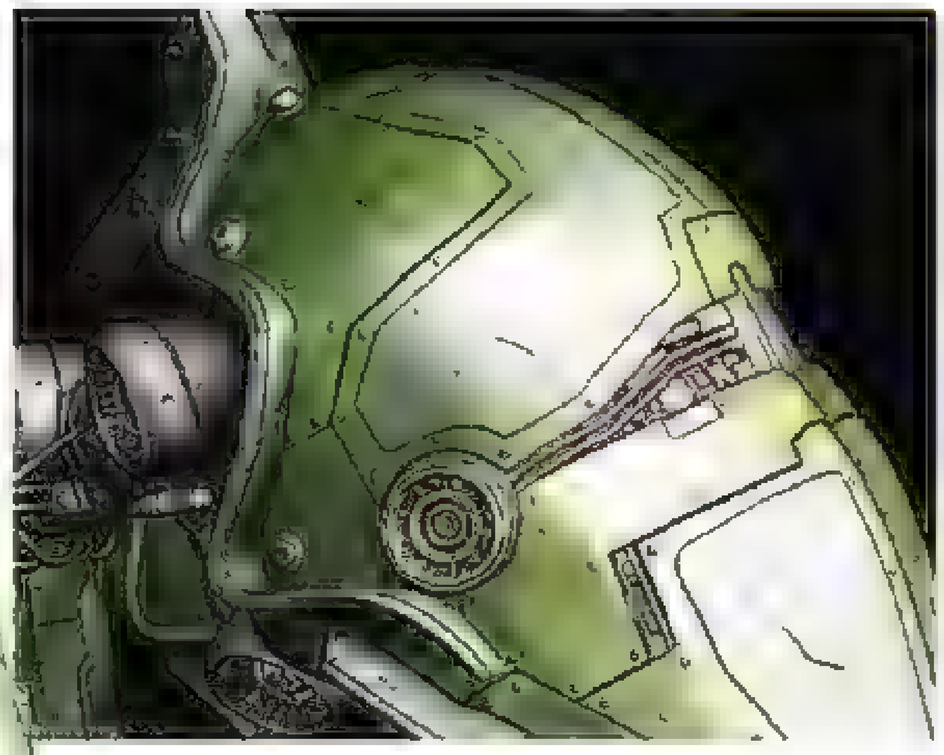


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Finishing touches

Adding colour and texture

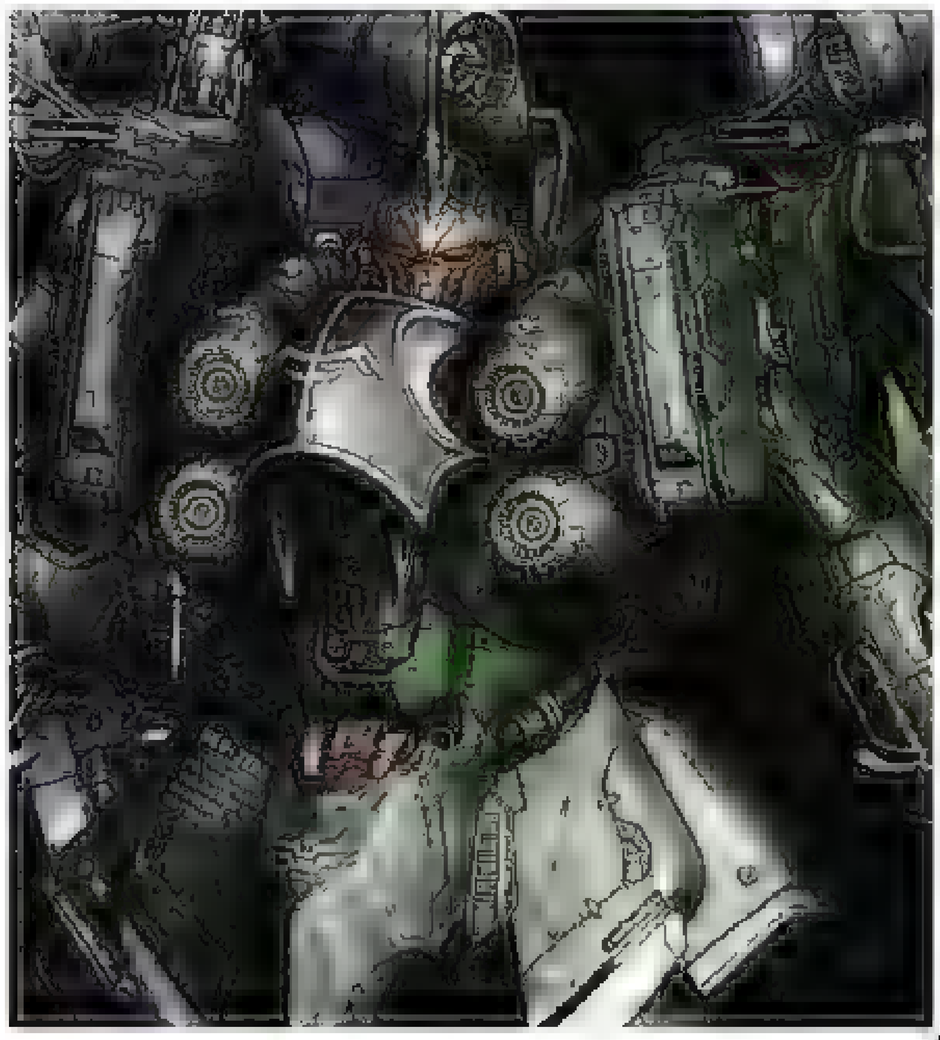




07 Colour palette

Because I spent lots of time sculpting the details, it saved me time from having to paint detailed textures. Before I start painting, I try to think what kind of look I want to give to model, for this mech, I was thinking military marine tank colours.

I start painting flat colours as an overlay in Photoshop. My main colour was green, mixed with with a more saturated green. I also added red and yellow to add detail and variety.



08 Secondary details

For my last texture step, I overlaid rust metal textures and decals to give a more realistic feeling to my composition.

09 Mood lighting

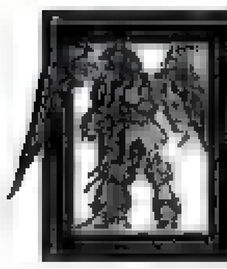
After I finished texturing, I thought it would be better to add a more dramatic light. So I rendered a new light pass that comes from the right side, and I darkened the left side. I also added glowing red eyes to make my mech look more menacing.

10 Final thoughts

Creating this image was a great experience. Working on the piece gave me the opportunity not only to be creative but to be a technical artist too.

I'm proud of my work. I believe that a big success with this image is that I managed to create a complicated mech that is also stands up as a piece of art. It wasn't easy to build, so now I feel satisfied. I love mechs, but something I may do differently in future is not overcomplicate things and try not to over-build parts that I don't need.





View other examples of Ioannis Karathomas' work at jkarathomas.com

If you would like to see your work in our portfolio section, please send your images to: *portfolio@3dmag.com*

Hooked's environments are packed full of detail; even individual grains of sand were modelled for certain shots

Short Cuts
The best new animated shorts from outside the major studios

Underwater encounter

Hooked presents a feisty little fish who doesn't take the bait. Kerrie Hughes talks to its creators about working on a film full of detailed water environments

In a tale of determination and persistence, short film Hooked tells the story of Breamy. A small fish on the hunt for food, Breamy can't believe his luck when he happens across a big, juicy worm, but soon realises all is not what it seems when a shiny hook becomes apparent. Annoyed for nearly taking the bait, the feisty little fish then makes it his mission to outsmart his pointy enemy, although his innovative strategy doesn't work as planned.

Hooked was created by Cape Town-based studio Character Matters, which created the side project in just three-and-a-half months. Director Friedl Jooste says the team wanted to make a short that would really push their collective skills. "We decided to go underwater. Immediately the creative gears started turning, and I thought it would be funny to show the conflict between a fish and a hook."

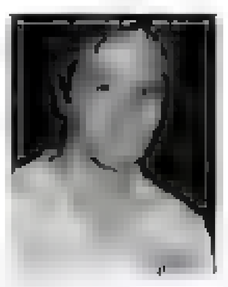
With the theme decided, the director developed the characters while he was still contemplating the story. Having already decided on Breamy's personality, Jooste drew pages of simple shapes until he came across one that he could develop into his hero. His choice of animal did present him with new personal challenges, though. "I hadn't animated a fish before," he explains. "It took some time and a lot of research to get Breamy moving believably."

With few characters to organise, the team was able to focus most of its attention on the challenging environment, which they started by deciding on a colour palette. "We wanted to steer clear of ocean colours," says concept and lead texture artist Lynton Levengood. "So we shifted everything towards greens, browns and yellows." With so many textures and elements involved, Levengood ensured they were tied together seamlessly: "We really wanted to avoid polygon clipping where objects intersected, and went to great lengths to make sure every shot was beautiful," he says.

Using Maya, animator Niki Dilliers set to work on creating the detailed sets, even modelling individual grains of sand for certain shots. This layout was the starting point for one of the most challenging aspects of the film – lighting. Being underwater meant that the light rig would be a complicated set-up, so extensive research was carried out in preparation. Watching nature documentaries while listening to serene music gave lighting TD Ben Cooper the information and inspiration he needed to begin. "Before I start a lighting, I like to feel the emotion that we're trying to convey, and music is a great way to draw that essence out," he says.

Using LightWave, Cooper started with the master light rig for the environment, which comprised a dome and several area lights to provide overall illumination with highlights in specific areas that called for them. "These area lights were scaled up to soften shadows and were then balanced until I got a look that we were happy with," he explains.

To aid overall render times, the environmental volumetrics were created on a separate layer, which also meant that the brightness could be controlled in composition. With these organised, effects such as post glows were added in production to bind them all together.



VITAL STATISTICS
Hooked
2.4B
Friedl Jooste

3.5 months
$35,000

charactermatters.com
Maya, LightWave
Fusion, Photoshop, 3D-Coat
A determined little fish formulates a plan to get rid of his foe, with unexpected results

Finding Nemo (Stanton/Unkrich/Pixar, 2003)
Shark Tale (Bergeron/Jensen/Letterman/DreamWorks, 2004)



Hooked director Friedl Jooste carried out extensive research to animate Breamy correctly

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Breamy's eyes had subsurface scattering to avoid a 'plastic' look

When the overall environment rig was completed, Cooper had to tackle the supplementary lighting needed for the many different elements within it, such as caustic effects, Breamy and the plant life. All of these required extra attention to fully achieve realistic underwater scenes. The caustic effects were created with a map sequence generated in the compositing package Fusion and the old Speed Six Watery plug-in, which were then combined with the custom spotlights in the shot.

The difficulty with this particular effect was matching the speed of the caustics to that of the water surface to avoid them counteracting each other. To solve this, the same map sequences were applied to the volumetric lights to ensure they were perfectly in sync with the shape, direction and speed of the caustics. The addition of environmental fog and tweaking in post production completed the effect.

Breamy's textures and shader network meant yet another separate lighting rig. A standard three-point lighting system with an additional fill light was used because of his shape, and helped to create an even light over him. "I rendered the rim light on a separate layer for better control in Fusion and mixed the layer with the composite," says Cooper. The fish's eyes had subsurface scattering to avoid a plastic look, and a point light was used behind him to enhance the light scatter through his fins.

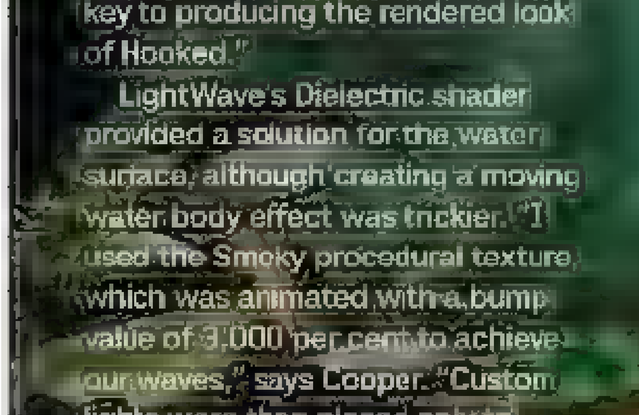
Lighting the plant life proved an added complication. "When I added subsurface scattering, things started to get tricky," says Cooper. "To get them to behave correctly without having to touch the lighting, which worked for everything else, I had to create custom lights that only affected them."

The amount of work from all the team members on Hooked inspired each of them to push their creative skills. "It was a big challenge for everyone involved," says Jooste. "What we have learnt has only left us hungering for something bigger and even more challenging." ■

KEY TECHNOLOGY

The underwater location for Hooked meant that one of the biggest challenges was to create a body of water with lighting that affected the environment realistically. LightWave was chosen for this job, with lighting TD Ben Cooper praising the NewTek software: "It was definitely key to producing the rendered look of Hooked."

LightWave's Dielectric shader provided a solution for the water surface, although creating a moving water body effect was trickier. "I used the Smoky procedural texture, which was animated with a bump value of 3,000 per cent to achieve our waves," says Cooper. "Custom lights were then placed only to affect the water and craft the look."



WATCH THE SHORT

You can watch Hooked in full via the 3D World website

One of the Hooked team's biggest challenges was creating the caustic effects



The Hooked team chose to make an underwater film to really develop their skills

Send us your short

To submit work for inclusion in Short Cuts, contact us at the address below, attaching a brief synopsis and at least three stills

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Will 3D World eventually be available in a digital format other than through Zinio?
Toffer, via email

Yes, eventually. Our parent company Future Publishing is busy trialling all sorts of different digital delivery systems, such as the best-selling iPad version of gadget mag T3 (tinyurl.com/t3app). We're still thinking about ways of delivering our disc content, but we'll have some news on this later in the year.

I recently bought your ZBrush book. I really enjoyed the projects in it, and found it nicely aimed at someone of my skill level. (Not very high!) Are you planning other books on other 3D applications?
Jonathan Ford, via email

Glad you liked the ZBrush 'bookazine' (not quite a book, no quite a magazine, but somewhere in-between). ZBrush Essentials was really well received, so the good news is that we have several lined up for the rest of the year. First out of the blocks is 3ds Max Essentials, which covers modelling, texturing and lighting for buildings, vehicles and characters. You might have seen some of the content before in 3D World, but the majority of it is new, courtesy of 3D Total. It's already on sale – you can order it online at myfavouritemagazines.co.uk/3ds-max-essentials, or check newsagents and newsstands.



Following the success of our ZBrush Essentials guide, 3ds Max Essentials is now in stores or available to order online

You mentioned a while back that you'd be doing a glossary of CG terms. I think this would be very useful for beginners like myself, especially if you have images to explain it and how to pronounce words like Fresnel and Bézier. Will this be appearing in the mag?
Glenn Avery, London

We did indeed promise a glossary, and we have delivered. You'll find the first version at 3dworldmag.com/3dterms. Please do take a look and let us know if there's anything you want adding, or if we've missed something obvious. We'll also be including more images over the next few months to make the glossary even easier to use, and there are more services to come.

Tomahawk_kid
Carl Douglas
@3DWorldMag I would really like to see readers get a chance to submit tutorials, but Maya/Nuke integration is something I'd smile at. We'll accept tutorials from anyone just email us for details. Nuke and Maya, you say? We'll shove it on Rob's to-do list.

DanCole3D
Dan Cole
I wish my demo reel was as good as this: http://vimeo.com/19368587. We hear ILM and Pixar are now in a bidding war for his not inconsiderable talents.

nicecrispybacon
Jan Daghelinckx
@3DWorldMag Does Mental Roy have a Twitter account? I'd sure follow. Our legal department has suggested that it would not be wise to unleash Roy on the Twittersphere.

uniformtweets
Uniform
Nice piece on our Colosseum film in this months *@3DWorldMag* Projects Showcase. Good work team, fives all round... Enough hand slapping: back to work.

damaroyWorkshop
damaroyWorkshop
The cover page for the May 2011 edition of *@3DWorldMag* rocks! Contact your local vendor now!

Yes, people do seem to like issue 143's cover art... thanks to Nicolas Richelet.

VFXMedia
VFX Media Corp
Softimage history: 10 years ago, this review of XSI 2.0 appeared in *@3DWorldMag*. XSI Essentials was $8,200. http://bit.ly/dlyLtu (UA). XSI Advanced was $12,300. But it did 3D text: money well spent.

JMcCurry3D
James McCurry
Today seems like a good day to subscribe to *@3DWorldMag* and that's not an April Fool's joke.
(DW) Every day is a good day to subscribe. Especially if you'd like a free copy of PFhoe! See page 52 for details.

Ant_Ward
Antony Ward
Using my lunch hour to add the final touches to my article for *@3DWorldMag*.
Read Ant's Maya tips in a future issue.

TheHead_3D_VFX
Ben Thomas
@3DWorldMag Aw, you guys sound ever so sad and lonely, asking for people to like you :P
(DW) We crave attention... what can we say?

creativebloke
creativebloke
@3DWorldMag I like you. Oh I seeeeeeeeeeeeee. Facebook... bleuch.
(DW) Not a Facebook fan, we take it?

Go online to talk about the hottest 3D trends and share tips. There's a Creative Challenge every month for you to flex your 3D muscles on, too

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Email us your feedback on the magazine or the state of the 3D industry in general at the address below, including the country in which you live. The sender of the best letter each issue receives a prize.
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3D WORLD *Creative Challenge WINNER*

Our latest challenge – in which you could win a copy of ZBrush plus training books – proved immensely popular, with tons of great entries. In joint-second place were Noon, with his spear-wielding warrior, and Peter Satera's chained monster. But taking top slot and the ZBrush licence is Quicky, with his gruesome bug creation.









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e-on software

beyond inspiration

Vue procedural planet by Dak Pandhi

Release: StoreMags & FantaMag



The GDC demo of Project Skyline shows the game trace view, where individual animation clips can be seen on the timeline

Bridging the digital divide

Autodesk looks to build the future of game development with Project Skyline

Without a vision, the people perish. It's a situation that can even affect digital media creation software companies like Autodesk; or perhaps that should be, *especially* affect companies like Autodesk.

A giant of the industry over the last several years, it's been busy acquiring major rivals such as Alias and Softimage. So the intense rivalry of annual releases from competing packages 3ds Max, Maya and Softimage has been replaced by a more tempered product management approach. The big fish of the pond is running out of water to swim in. Where's the vision?

The overall market for game development tools is much bigger than Autodesk's range, of course. There are plenty of outfits providing game engines, physics, networking, artificial intelligence and the like. None are the size of Autodesk, but all have experience in real-time technology; an area in which the company has almost none. That's one reason it's been buying up middleware companies such as Kynogon and Scaleform. (See The Scaleform Factor, page 28.)

Yet Autodesk is bridging the gap between content creation and runtime engines that is the main prize, offering massive potential both in terms of productivity gains for game makers as well as commercially for the tools supplier. Ah. Now *there's* a vision.

In this context, it's significant that Mathieu Mazerolle, the project manager of Autodesk's Project Skyline initiative, has come to the company, following stints at game publisher Ubisoft and special effects house Digital Domain. Just as Skyline, which was first publicly shown in an animation demo at the Game Developer Conference, is an attempt to bridge that gap, so his career has been spent working across it.

"Based on my experience working on Assassin's Creed, the artist makes these lovely character animation clips, which need to be assembled into blend trees and combined with physics and IK," says Mazerolle, explaining how animation works in the traditional game development process.

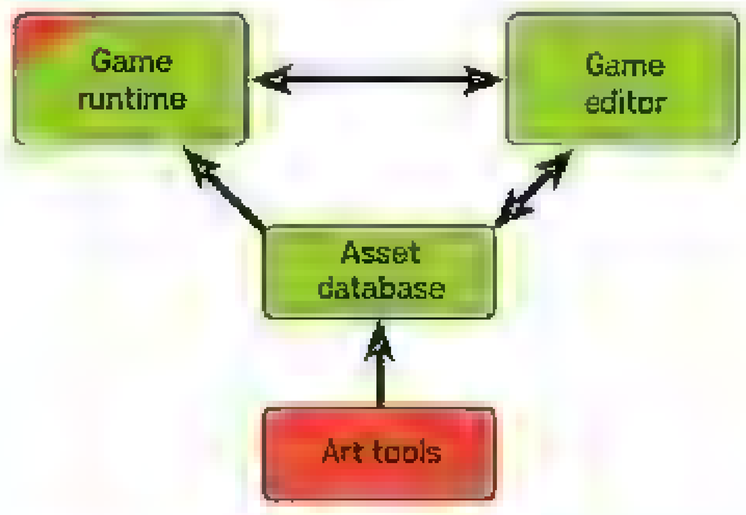
The finger of blame

"By the time the programmer has stitched everything together and the artist gets a chance to see the integration in the game engine..." He pauses. "This is where we start what I call 'pointing the finger of blame'."

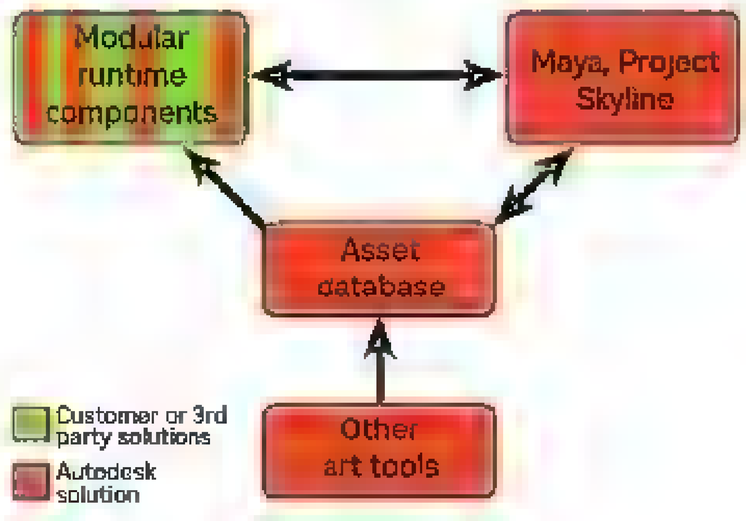
Not only can this phenomenon be detrimental to team morale, it's also a key obstacle to the final quality – not to mention production efficiency – and hence a drain in terms of overall cost and timeframe.

"The challenge is providing transparency in terms of how different elements work together," Mazerolle says. "The artist doesn't have visibility of how the programmer is modifying his animations, and the programmer doesn't have visibility of the artistic intention. With Skyline, we want to bridge this situation so the artist can see changes instantaneously, but also to create feedback that enables the game engine

CURRENT GAMES PIPELINE



PROJECT SKYLINE PIPELINE



Project Skyline hopes to replace the iterative asset creation process with a closed loop system

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to talk back to our tools. Being able to see what's going on within the runtime environment, the interaction with elements such as game logic and AI that the content creation tool doesn't create, is the key innovation for Skyline. It's a really powerful type of workflow."

As with many technological innovations, it's this point of intersection and interaction between two previously separate areas that could change everything; and a sweet spot Autodesk feels it's uniquely placed to solve



"We care about game development as a holistic process, and one that involves people who don't [only] create polygons"
Mathieu Mazerolle, project manager

While the demo only dealt with animation, Project Skyline's ultimate goal is to handle all elements of the development process

"This is an issue that people in the games industry are familiar with on a day-to-day level, but they don't have a lot of time to solve it," Mazerolle suggests. "But it is logical for Autodesk. If we were lazy, we would go on making tools for artists and not worry about the programmers and level designers, but the reality is we care about game development as a holistic process, and one that involves people who don't [only] create polygons."

The underlying framework to Skyline is a node-based visual programming environment, codename Ammo. It's influenced by Softimage's ICE (Interactive Creative Environment) technology, although that influence is described as being more of a brain trust than actual code.

"We were able to retain a lot of the workflow and user interface, and recoup a lot of work at the conceptual level, which is why we're been able to move really quickly on this project," Mazerolle says of ICE. "The lessons you learn building a system such as ICE are lessons you learn about how people work with visual programming in general."

That Vision thing

It was a similar situation in terms of choosing a game engine to integrate into. Autodesk could have built its own, which would have been easier in terms of creating dedicated hooks, but instead it took German provider Trinigy's cross-platform Vision engine. The point to prove was that the technology would work with any off-the-shelf engine. "It was a harder road," says Mazerolle. "We used Vision as a black box solution, without any modifications, which wasn't always easy.

"But the reason we held ourselves to that decision was to test our approach. Over 80 per cent of our customers use custom-built engines, so you have to ensure you provide the right »

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As well as being used for 2D Flash development, Scaleform also provides high-end 3D UI and, as shown, is integrated with Epic's Unreal Engine 3

THE SCALEFORM FACTOR

ACQUISITIONS HELP PREPARE AUTODESK FOR AN ADVANCE INTO THE MIDDLEWARE MARKET

Like many large, well-funded companies, Autodesk has made the most of its resources in terms of acquisitions. But while Softimage and Alias were deals done for competitive advantage, more recent purchases such as French AI company Kynogon, Swedish rendering outfit Illuminate Labs and now US user interface tools provider Scaleform have been about expertise.

"It's about Autodesk wanting to get into the middleware space. We didn't have direct experience of integrating with the technology or supporting customers," explains Marc Stevens, vice president of games. "There are two big trends happening. In console development, the budgets keep growing, the requirements get higher, and people are struggling to make titles in a cost-effective way. Conversely, there's a boom in the handheld and mobile space. It has a different dynamic; small budgets and 2D games."

In this respect, the acquisition of Scaleform, which has been used in over 800 games, plays well to both parts of the market. It's been integrated into Epic's popular Unreal Engine 3 middleware as the default UI engine, as well as being used to make complete Flash games on web and mobile.

Stevens is particular keen on the opportunity provided by the latter. "With Scaleform, we can provide smaller developers with 2D tools now, introducing them to 3D over time. It's a better option than coming right out with a 3D solution," he says. "That's way too big a leap for many of these studios. They're a new class of customer for us, but Scaleform has the expertise and relationships to help us get to where we want to go over time."

pieces, and that you don't have too many wires sticking out."

Running Skyline in Maya was another pragmatic choice to get up and running quickly. "We needed a UI, viewports and tools that we were familiar with. Maya is the most open platform. It's not an anti-Max thing," he says.

Yet for all the excitement following the GDC unveiling, Mazerolle is keen to point out that Project Skyline is in its earliest stages. "The level of excitement took me by surprise, and when people get excited, the first thing they want to know is 'When can I have it?'"

"We're not at that stage yet," he admits. "We want to make sure we're doing the right thing first. Our product development process is very deliberate. We take it in small stages and make it transparent, and get people to kick the tyres, but we're currently at step one."

Indeed, Mazerolle expects plenty of changes, perhaps even fundamental ones, before Project Skyline loses its prototype status and, presumably, its codename. "You shouldn't have any sacred cows when you're trying to build a good architecture," Mazerolle says. "The ultimate test is always the customer. No matter how well you build the foundations – and we've built strong foundations – I think once this gets into the hands of users, we're bound to change our assumptions. We're prepared for that."

"There's a boom in the handheld and mobile space. It has a different dynamic: small budgets and 2D games"
Marc Stevens, vice president of games

The road ahead

Still, at this stage of the process, it's not the technology that's the important thing, it's that vision thing. "Part of showing Skyline was to fire people's imagination," Mazerolle enthuses.

"That's what's really exciting for me. Speculation about where it will be going after animation is good in terms of our next step, although it might be years off. It's good to stir the beehive sometimes, and scaling to deal with bigger problems is where Skyline becomes more than a little project. If we're on the right track, it's something Autodesk can have faith in." ●

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WS1610

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- MS Windows 7 Pro 64Bit

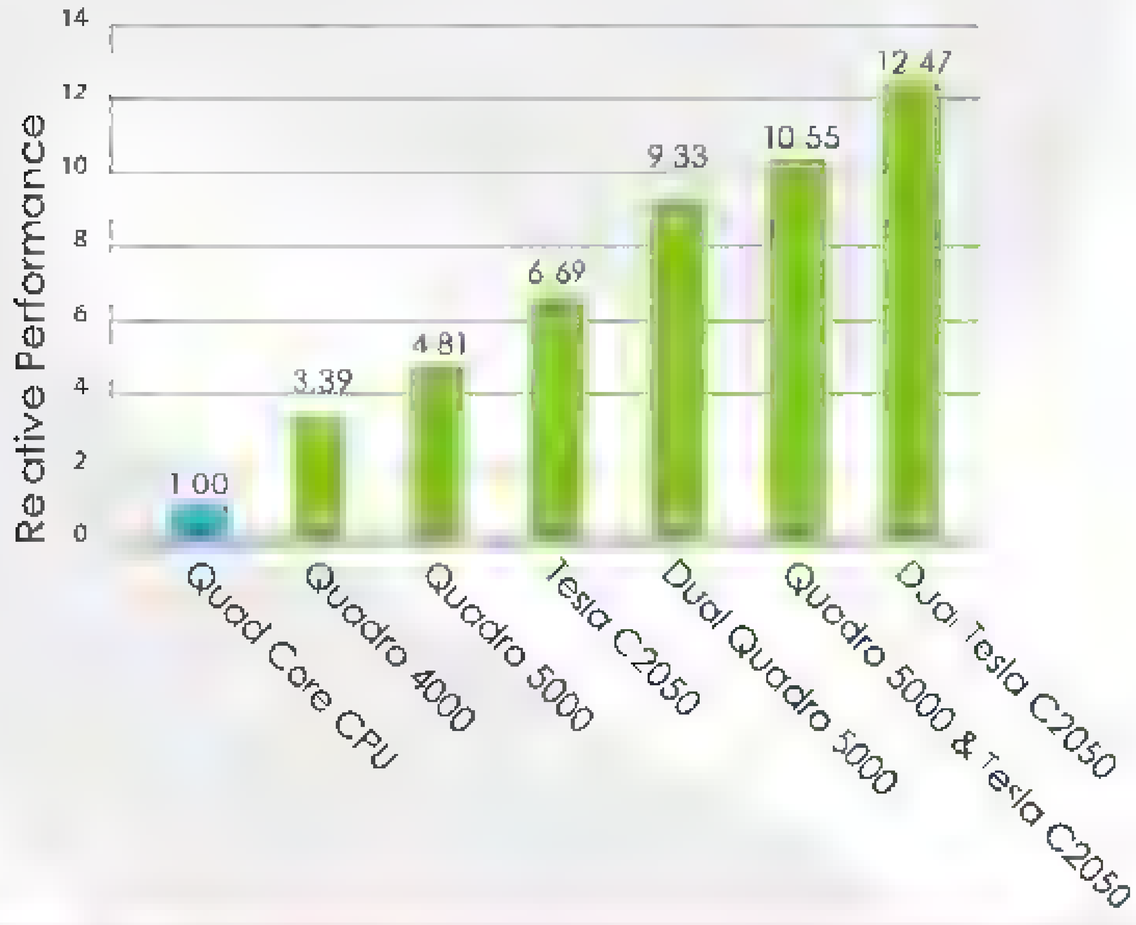
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The Filter

Our pick of the past month's 3D software and training resources, ruthlessly stripped of PR hyperbole. Visit 3dworldmag.com for more product stories and all the breaking news



Momentum 2.0

DEVELOPER: Exocortex
WHAT IS IT? Update to the high speed multiphysics simulation system for Softimage
WHAT'S NEW?
- Simulates everything from rigid and soft bodies to plastics, cloth and rope
- Bullet simulation library provides real-time results
- Deep integration into Softimage, accessed from a user-friendly toolbar or via ICE
- Solid, stable and production-ready

THEY SAY: "Exocortex Momentum 2.0 is the most versatile real-time multiphysics solver available for Softimage. It's designed to integrate well with both Thiago Costa's Lagoa fluids and Syflex's cloth"
WE SAY: With the holy trinity of Syflex Cloth, Lagoa Multiphysics and now Momentum 2.0, it's difficult to imagine what you can't simulate in Softimage: the sound of competing apps' jaws dropping, perhaps?
PRICE: $149
MORE ONLINE: exocortex.com



CameraMan for Maya

DEVELOPER: The 3D Ninja
WHAT IS IT? App for creating camera animations in Maya using an iPhone 4
MAIN FEATURES
- Control over the X, Y and Z rotation of the camera
- Adjust focal length as well as play, pause and rewind the timeline using the iPhone
- Record co-ord system to keyframes in Maya

THEY SAY: "CameraMan for Maya allows you to control a 3D camera in Maya using an iPhone 4. It lets you create handheld camera effects by using the iPhone's gyroscope as a motion capture device"
WE SAY: An ingenious little gizmo. However it might be worth waiting for the first update, which promises to add accelerometer support for translation as well as rotation – that will really help to unleash your inner James Cameron
PRICE: TBA
MORE ONLINE: the3dninja.com



Relight

DEVELOPER: The Bakery
WHAT IS IT? High-performance relighting and rendering software
MAIN FEATURES:
- Provides interactive relighting at final render quality
- Multi threading and caching system limits computational overhead
- Reyes rendering engine supports ray tracing, volume rendering and point cloud illumination

THEY SAY: "Our software has been designed to hone the lighter's workflow. Instead of having a 3D program coupled with a separate renderer, we propose constant interactive visual feedback in the rendering engine itself"
WE SAY: Aimed at the high-end CG industry, this new system promises to be a real time-saver – but will studios want to switch to a new rendering engine?
PRICE: On application
MORE ONLINE: bakery3d.com



emRPC4

DEVELOPER: Mootzoid
WHAT IS IT? Update to the ICE point cloud renderer for Softimage
WHAT'S NEW?
- Now supports global illumination, ambient occlusion, motion blur and depth of field
- Improved multithreading and workflow
- Includes emRPC4 custom display host

THEY SAY: "emRPC is implemented as an ICE node. Even though the node renders the particles in a rather primitive way, it can come in handy when dealing with many particles because it has one great feature: it is fast, so rendering a frame generally only takes a few seconds"
WE SAY: emRPC4's output is quite beautiful, and the new custom viewer takes the hassle out of tweaking settings. One for the VFX and mograph crowd
PRICE: €99
MORE ONLINE: mootzoid.com

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Release: StoreMags & FantaMag



XrayBlendSkin

DEVELOPER: Raylight
WHAT IS IT? Interactive skinning plug-in for 3ds Max (2008 and above)
MAIN FEATURES:
- Dual-quaternion skinning maintains mesh volume
- Interactive link between linear and dual quaternions
- Mirror tools to consider blend weight
- Control influence by weight painting

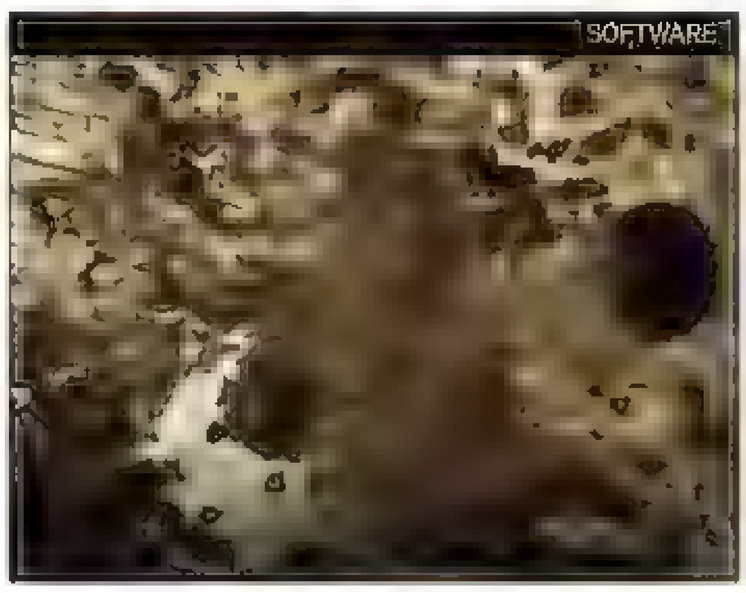
THEY SAY: "Dual-quaternion skinning maintains volume a lot better, but it cannot be used alone as a general solution. In some situations, you may still need to maintain linear skinning and with XrayBlendSkin, you can"
WE SAY: This looks like a really helpful tool for game animators struggling with unwanted mesh deformation. The weight painting tools are also well thought out, which should ease the frustration of this often tedious task
PRICE: €15
MORE ONLINE: raylightgames.com



Frost

DEVELOPER: Thinkbox Software
WHAT IS IT? Meshing plug-in for 3ds Max
MAIN FEATURES
- Accepts particle data from many different sources, as well as objects, NURBS and splines
- Particle data is used create iso-surfaces or for geometry replacement using various modes
- Produces two types of motion blur data depending on the type of effect and renderer being used

THEY SAY: "Frost is a compound geometry object for 3ds Max that can be used to generate a single mesh from particles, vertex clouds, objects positions, point data files or a combination thereof using various iso-surface or geometry cloning techniques"
WE SAY: If it's as fast as Thinkbox suggests, then this could be a great alternative to external meshing systems (such as RealFlow). It also opens up a whole range of distinctive creative possibilities
PRICE: $495
MORE ONLINE: thinkboxsoftware.com



RayFire 1.55

DEVELOPER: RayFire Studios
WHAT IS IT? Shatter effect plug-in for 3ds Max
WHAT'S NEW?
- Fragments objects faster with Rayfire Fragmenter modifier, using 64-bit and multi core support
- Secondary fragmentation for realistic results
- Custom fragmentation properties for interactive demolition depth levels
- Voronoi, Wood Splinters and Brick frag types

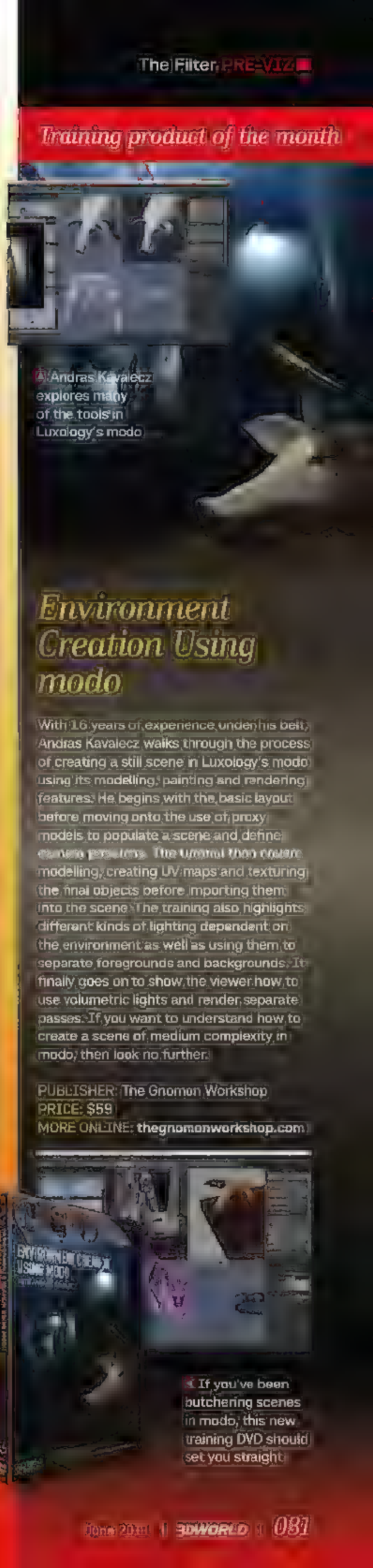
THEY SAY: "The RayFire tool gives you the ability to fragment, destroy, demolish, wreck, break down, wreak havoc, blow up, burst, detonate, explode and do other similar things you have always dreamed of doing in 3ds Max"
WE SAY: One of the most satisfying things you can do in 3D is smash things up. And this new version just lets you do it faster and better
PRICE: $325
MORE ONLINE: rayfirestudios.com



V-Ray 2.0 for Maya

DEVELOPER: Chaos Group
WHAT IS IT? Extensive update of the industry-standard renderer
WHAT'S NEW?
- V-Ray RT interactive previewer
- Faster rendering of dynamic geometry such as fur and hair, and subdivision surfaces
- Support for Maya fluids, Substance textures, RealFlow .bin files, PTex textures, toon shading

THEY SAY: "We're very excited to finally release the 2.0 version of V-Ray for Maya. This release is a huge step in the development of our product; the addition of interactive rendering on both CPU and GPU is especially exciting for us"
WE SAY: Faster, better, more extensible, and with support for the latest technologies. This long-awaited update looks to be right on the money
PRICE: TBA (currently in beta)
MORE ONLINE: tinyurl.com/vray2



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Part 6

These ones go to eleven

When your workstation is your canvas, there's always room for more. More power, so you can bring your ideas to life even more quickly. More mobility, so you can work wherever your muse takes you. More memory, so you can do more things at once. More storage. More connectivity. More flexibility.

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These ones go up to eleven.

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Every Dell Precision mobile workstation can be configured with enormous storage capacities – up to 1.5TB in the Dell Precision M6600 – enabling you to carry all your digital assets with you, and you can mix and match traditional hard disks with super-fast solid state storage to boost performance without skimping on storage space. Optional FIPS certified encryption can keep your data secure, and optional RAID storage is available too. Easy access removable hard disks make it easy to swap between multiple drives, and the Fast Response Free Fall Sensor provides superb data protection in the event of a fall or drop.

We've made big improvements to the little things, too. Built-in array microphones benefit from Acoustic Echo Cancelation for headset-free VoIP and videoconferencing. "Beam Forming" algorithms focus on your voice even in noisy environments, while the optional backlight sensitive Dell Webcam delivers true HD pictures and video. There's also an optional backlit keyboard that enables you to keep on working in low-light environments.

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We designed our Precision mobile workstations for professionals who demand the utmost strength and reliability. We've invested hundreds of engineering man-hours and conducted intensive testing to optimise the performance and reliability of our workstations in the applications you depend on, ensuring that you get peak performance and rock-solid reliability, day after day.

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Good advice

Find the perfect creative partner without scanning the spec sheets

Dell's 'build to order' philosophy means you can design your own system down to individual components, creating a machine that's as unique as you are – and if you'd rather skip the spec sheets, the Dell Precision Workstation Advisor can do the designing for you. By telling the advisor what you do and what applications you prefer it can help you choose the perfect Dell Precision.

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Six ways to...

Create the perfect showreel

You only get one chance to make a good first impression, and you need a pitch-perfect showreel to make it count. But what separates the bad, the good and the great? **Mark Ramshaw** finds out with the help of some of the CG industry's leading talent and recruitment experts

Illustrations by Teodoru Baciu

01 Pace yourself

Bigger isn't always better when it comes to building a showreel – but making a grand entrance works every time

Timing is everything. It's a cliché, certainly, but one that everybody building a showreel would do well to remember. While it's understandable that you'd want to cram in as much good material as possible to overwhelm a potential employer with your brilliance and make sure you show every single one of your formidable skills, the harsh truth is that few artists – especially those without real industry experience under their belt – will have enough truly great material available to put together a strong reel lasting more than a couple of minutes.

"You see far too many animators trying to build their own five-minute Avatar, and they end up getting so sidetracked by everything else that the actual animation becomes the last thing they do," says Andrew Daffy of The House of Curves. "By contrast, I always remember the story of one the guys who became a key animator on [the BBC TV series] Walking with Dinosaurs. His reel was about a minute-and-a-half long, and it was a five second sequence that got him hired. All it showed was a stock figure. It was even badly rendered – but the body language was so perfectly animated."

It's also worth considering showreel duration from a studio's perspective. They're likely to receive unsolicited reels on a regular basis, and endure an avalanche every time a position does actually become available. Creating a reel that outstays its welcome is not a good way to gain their attention.

"Don't make a reel that lasts 25 minutes and chronicles your entire meteoric rise through the ranks of scholastic fame," says Marco Marenghi of Sony Pictures Imageworks. "Animation supervisors are paid by the hour, so you could be costing the company a lot of money."

"Because we have to look at so many reels, we would recommend for them to be roughly one-and-a-half to two minutes in length," says Claire Anderson of The Mill. "We don't even always get all the way through, so I'd also say to put your best work at the beginning."

"When I was working in the industry, I would give potential showreels just 15 seconds to impress me," admits Neil Gallagher, senior lecturer at the University of Hertfordshire. "If an artist can't sell themselves properly in that space of time, there will be plenty of other people who can."

Gallagher suggests opening with your best work and then, just to ensure you don't begin with a bang and end with a whimper, close with your second-best piece. Beyond that, if your third favourite piece does in any way look second-rate, you might want to consider whether it really belongs on the reel at all. "You should only put your best work on the showreel and, provided it is tightly edited, shorter will always be better than longer," says Kim Baumann Larsen of Placebo Effects and Dimension Design. "If your work is great, nothing is better than leaving the viewer hungry for more."

If in doubt, try to think of each segment in your showreel as an advert, where the product being sold is you. As Lee Danskin of Escape Studios points out: "Commercials are 30 seconds long for a reason. Too much longer and they get boring."



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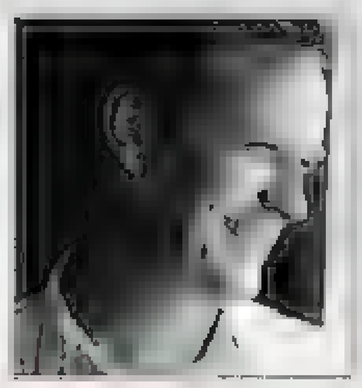
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The panel

THANKS TO THE FOLLOWING PROFESSIONAL ARTISTS, RECRUITERS AND EDUCATORS FOR THEIR INVALUABLE INPUT...



Andrew Daffy
Co-director,
The House of Curves



Lee Danskin
Training development director, Escape Studios



Claire Anderson
Talent Manager,
The Mill



Trond Greve Andersen
Co-owner, MIR Visuals



Patricia Kung
Senior Recruiter,
Animal Logic



Andrew Hellen
VFX supervisor,
fuelVFX



Karl Wickens
Co-Head of 3D
Double Negative



Pascal Blanche
Art director,
Jagex



Lon Grohs
Principal and creative director, Neoscape



Neil Gallagher
Senior lecturer,
University of Hertfordshire



Marco Marenghi
Animation supervisor,
Sony Imageworks



Kim Baumann Larsen
Founding partner,
Placebo Effects /
MD, Dimension Design

02 Stay focused

Never mind the length: when it comes to choosing content for your reel, it's all about demonstrating quality in your chosen areas of expertise

So you've decided on the ideal duration, but there's still the question of just what to put on a reel. Do you try to sell yourself as a jack of all trades, or do you potentially limit your scope by focusing on one or two key skills in your repertoire?

"If you're a generalist, you should show the scope of your abilities, but if you're a specialist, show nothing but the best examples of what you specialise in," advises fuelVFX's Andrew Hellen. "If there are other things you can manage, perhaps create a separate reel for your website or Vimeo page."

"At The Mill, we discourage people from trying to do too much," adds Claire Anderson. "We especially don't expect people starting out in the industry to be an expert in everything. Instead we look for people who show promise, where we can help them to build on their skills and experience."

Of course, the best work you can show will often have been a collaborative effort, be it a graduation project, or – more likely for anyone with industry experience – a series of past projects. Far from being a cheat, this can help demonstrate an ability to work well with others. Just be sure that you're up front about it. "Collaborative efforts are definitely fine; after all, almost all professional work is a collaborative effort," says Karl Wickens of Double Negative. "The most important thing is for an applicant to be clear exactly what they contributed."

While the temptation is to focus on finished work and maintain the maximum amount of showreel glitz, most potential employers welcome sequences that demonstrate how scenes were created. "We like to see some breakdowns on there, especially if you're using live-action footage," notes Anderson.

To ensure that these sit comfortably alongside the rest of the work, try using screen wipes (which ensure running time isn't adversely affected) and placing the breakdowns in the second half of the reel, once the final shots have worked their magic. Logically, sequences that exist purely as technical demos should be equally welcome, but some argue this depends on your specialisation. "They often look half-finished, which is fine for a technical role, but not for an artist," reckons Lee Danskin.

For modellers, Karl Wickens says including wireframe overlays can help to demonstrate a disciplined approach to topology layout. Neil Gallagher suggests aiming for around four different model types, while those with rigging skills should try to show a biped, a quadruped creature and maybe a vehicle rig. "In the case of riggers and other tools or technical set-up roles, like FX work, it's beneficial to show screen capture demonstrating the behaviour of controls, as well as finished examples of the content generated by the tool," adds Wickens.

Pascal Blanche suggests that turnaround or simple high-res model stills should be accompanied by textures and low-poly versions (to show skills in retopology and edge loops). "Then the extra bits: create some variations on the same model to showcase skills of creativity. Think upgrades, new gear within the same design style. Do all that and you will certainly end up on the shortlist."

Obviously, still model shots can look a bit dry, and not everyone likes turntables, so don't be afraid to add some dynamic camerawork. Just don't make it too obtrusive. It's harder to decide how best to show animation skills, but there are some clear dos and don'ts. "You should look to show weight, timing and balance, with set pieces that demonstrate broad physical motion," says Marco Marenghi.

Finally, don't forget that technical skills aren't confined to the keyboard. Try to ensure that everything on your reel, breakdowns and tech demos shows a good understanding of the fundamentals. "Make sure you demonstrate a clear knowledge of art theory," agrees Gallagher. "A great 3D artist should understand composition, colour theory, perspective, the rule of thirds, tone, balance and so on."

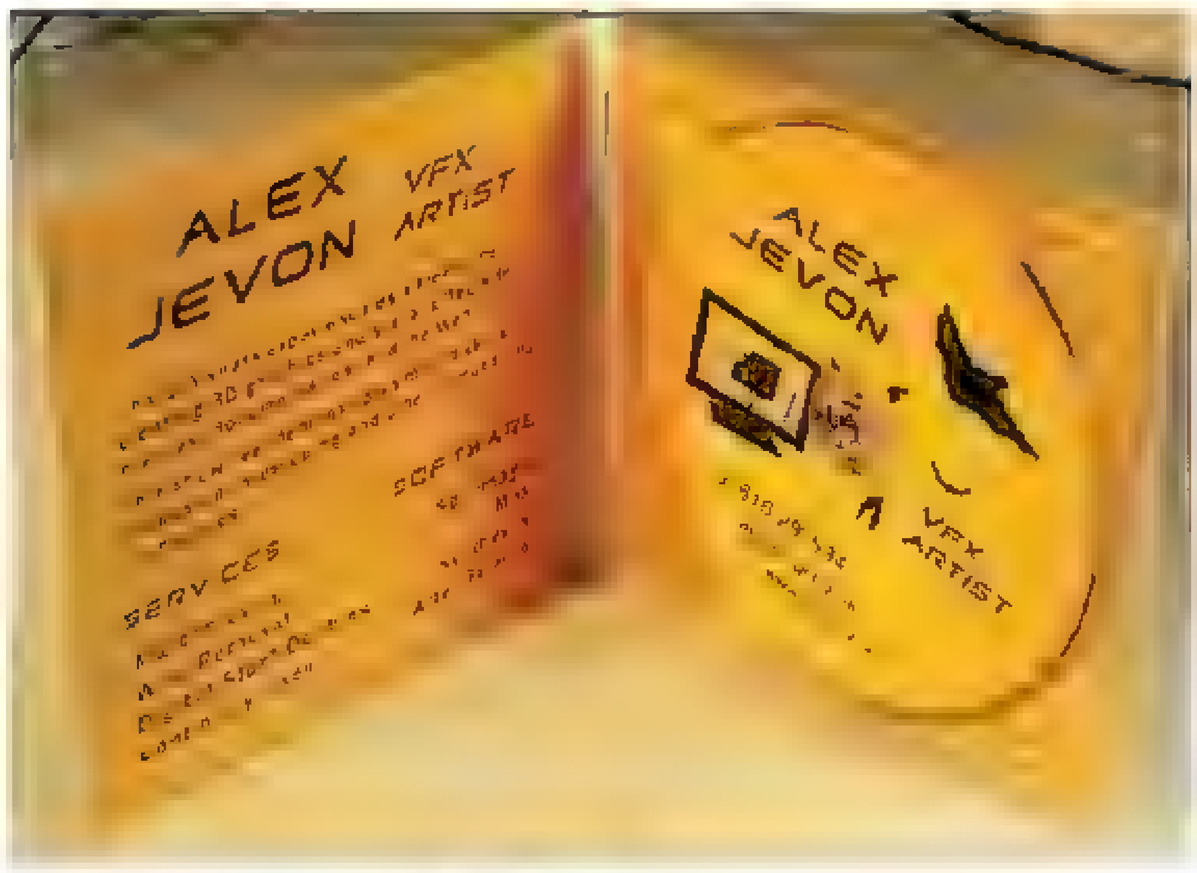
> **66** If you want to be a generalist, you obviously need to show you can do it all to a good level, but keep the reel short so that you don't overstretch yourself **99**
> Andrew Daffy, The House of Curves



Emphasise your strengths and you'll already stand out



Alex Jevon's showreel DVD highlights his VFX expertise



The packaging provides all relevant work and contact details

03 Present yourself

Content is king – but a little professionalism in the way you present your reel can go a long way

The ultimate aim of a showreel is to let people know what you're capable of, but how you structure your reel, the level of professionalism you show in its presentation, and even the format decisions you make can all influence the way your reel is received by a potential employer. "Good editing is important in order to pace the reel," explains Kim Bauman Larsen.

The trick, however, lies in making sure slick presentation works almost subliminally: it should enhance the perceived quality of the content without appearing overly flashy or drawing attention to itself. "Presentation is important, and attention to detail and elegance is great, but this can be over-engineered to the point it becomes more of a desktop publishing exercise than a showreel," points out Lee Danskin. "Unless you want to be in motion graphics, don't make it some flash edit to a beating thrash track."

Andrew Hellen agrees: "If you're an editor, then sure, cutting style is relevant; otherwise, just stick to what you are good at. A reel might have the five-star treatment, but if the skill set on show is substandard, then that will always be evident."

> "I like to see an artist's range, but there's no need to show me everything – just give me the top five and make it count."
> **Lon Grohs, Neoscape**

When it comes to choosing exactly how to present your showreel, things can be a little trickier. The Mill's Claire Anderson admits that the studio doesn't even bother with hard copies any more. Instead, applicants are asked to simply to email their CV, a shot breakdown and a showreel weblink – one either hosted on Vimeo or a personal website. But while it's fair to say that the DVD format is on its way out, there are still advantages to this format.

"At Double Negative, we do still request physical reels," says Karl Wickens. "Although there is an element of time-saving with online reels, we have found that these can get removed, and having a physical reel on file means we can always refer back further down the line."

In other words, it pays to be ready to cover all bases. Be prepared to burn DVDs for those postal applications, but also make sure you have a web presence. Certainly upload your reel to Vimeo and YouTube: the additional potential for a little extra publicity or being 'discovered' certainly won't hurt any.

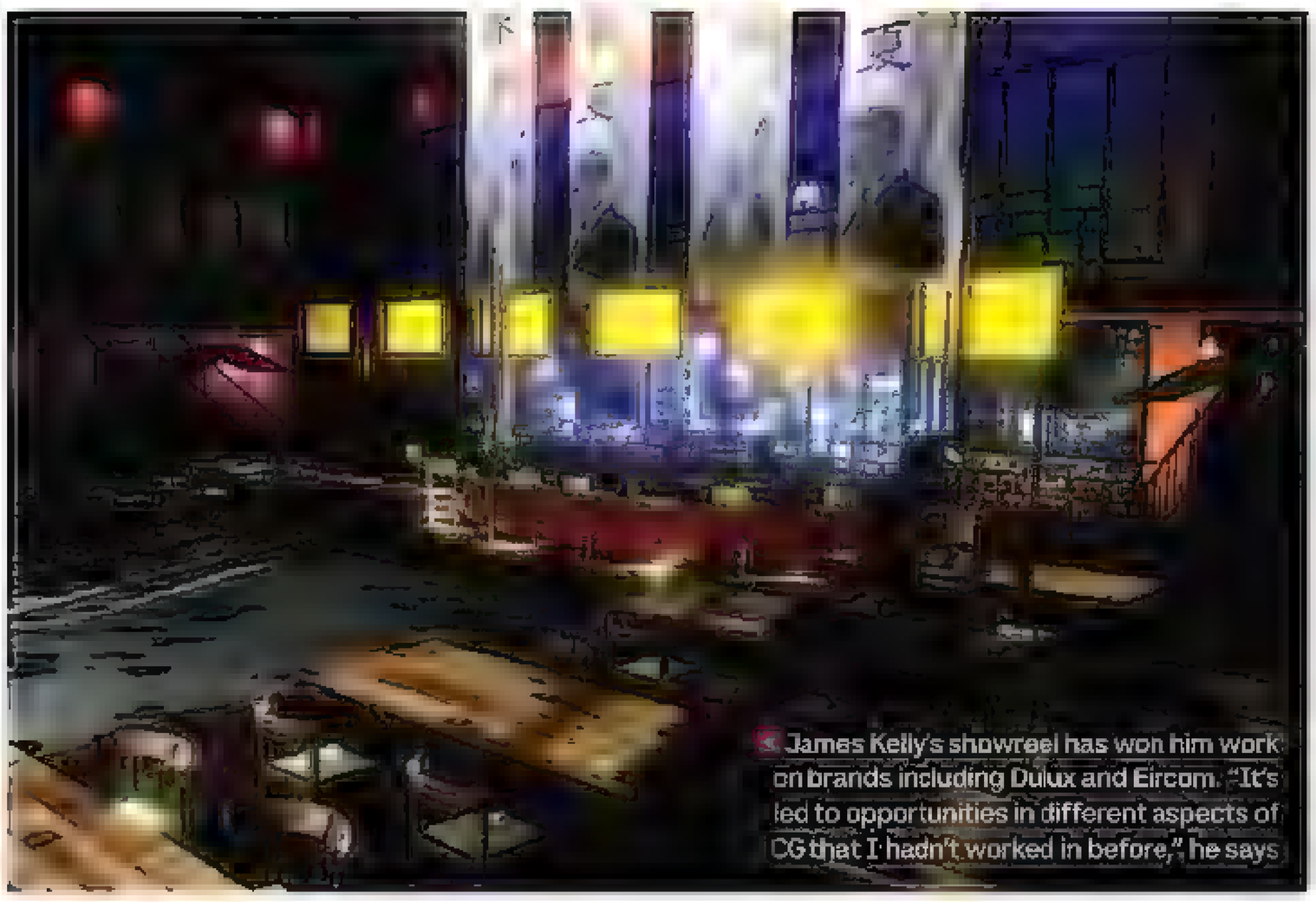


Also consider using a cheap or free website hosting service to create an online home where interested parties can also see your reel and find out more. The guidelines for restrained presentation styles in reels apply equally to your site. "Make your website as simple as possible, without any gimmicks," advises Lon Grohs. "And make sure you proofread and spell-check. Yes, CG is an art, but this is still a business." The aim is to remove any possible barrier between an employer and your work. Stick with standard video codecs (QuickTime or AVI), keep file sizes manageable, and make sure everything works on multiple operating systems and browsers. Don't give important visitors the slightest excuse to dismiss you before they've even seen what you can do.

A little bit of individuality goes a long way: make sure you present yourself professionally

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James Kelly's showreel has won him work on brands including Dulux and Eircom. "It's led to opportunities in different aspects of CG that I hadn't worked in before," he says

04 Do your research

Still send the same old reel out to everybody? Maybe it's time to look at things from an employer's perspective

It's great to be enthusiastic about your work, but don't forget the aim of a showreel is to sell your skill set. Think less about the material you like than about what a potential employer is likely to be wowed by. Clearly, it pays to do a little research, learning just what typically happens to a job application once it arrives in the post or the inbox at a studio.

Over at Double Negative, for example, each submitted reel is initially screened to check for updated applications, then sent directly to a senior artist with skills relevant to those of the applicant. "They assess the reel and decide whether to interview or to reject until the applicant has more experience," says Karl Wickens. "The best reels are passed onto the department head to decide when to interview."

Impressing a senior artist is obviously the key concern, but the first port of call at many studios will be a recruiting department, where professionalism counts just as much (if not more) as artistic chops. "It's important that the candidate has followed the instructions of the application process and their application is concise and presentable," says Patricia Kung at Animal Logic. "They need to be clear about the position they're applying for, and to provide all the necessary material: reel, shot breakdown and CV. The easier and more relevant the candidate makes it for the recruiter and supervisors to review their showreel, the better their chances are of being reviewed."

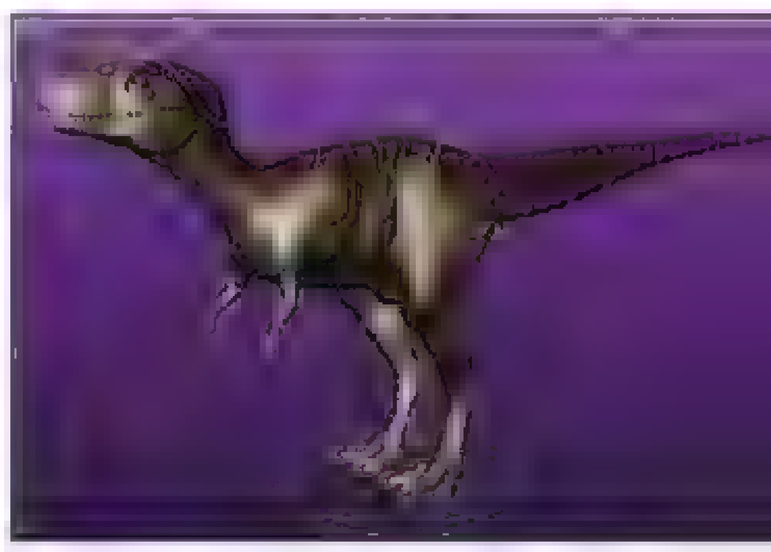
There's also the question of whether to maximise impact by tailoring your reel to suit the creative needs of the studio and the job being applied for. While some might argue that a mismatch between a general showreel and a studio's output suggests that the artist isn't right for the studio anyway, many artists – particularly those with prior industry experience – are likely to have a range of well-honed skills and the footage to demonstrate this; they can potentially customise their reel to show the right skills for the post (such as modelling, rigging or dynamics) as well as the right artistic leanings.

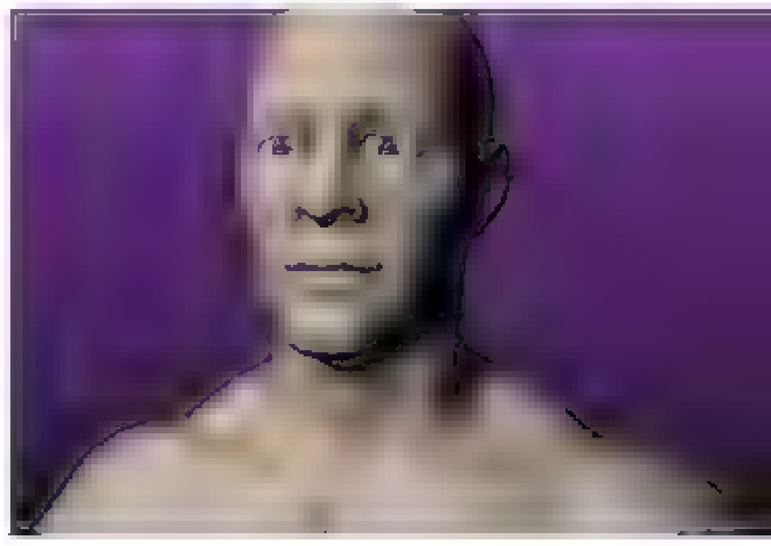
Neil Gallagher believes that reels need to be tailored for the kind of job being applied for, but points out that things are a little different for graduates, who are likely to be vying for entry-level positions. "They need to be specialised, but not too specialised. For a games industry job, three environment models, one hard-surface model and maybe a few assets would clearly demonstrate a range of skills and show that the applicant could handle most environment work."

The nature of the work can also dictate a reel's balance between final work and breakdowns. For posts focusing on the creation of CG stills rather than animated content, employers will tend to be more concerned about artistic abilities than technical ones. "Work method is totally unimportant to us," admits Trond Greve Andersen at MIR Visuals. "We don't want to see anything that has to do with modelling or texturing or matte painting or different passes. We simply want to see an impressive end product." »



Find out what skills your potential employer wants to see







Success story #1

HARRY GLADWIN-GEOGHEGAN, JUNIOR TECHNICAL ANIMATOR, BLITZ GAMES STUDIOS

How did you put your reel together?

"When I set out to create a rigging showreel, I knew I would have to display the ability to rig a range of different characters. My university course was 3ds Max-based at the time, but from industry talks and presentations I'd seen, I realised the majority used Maya. I started off with a bipedal cartoon character I modelled myself. There was a wide selection of rigging techniques I could explore, such as squash and stretch and facial rigging. For the other rigs, I wanted something more realistic, for which I helpfully had access to 3D models created by other students."

Did you customise the reel to suit the needs of Blitz Games Studios?

"After attending a Blitz open day, it was suggested that I would need to aim for purely joint-based solutions if I wanted to work in the games industry, so I set about doing a joint-based facial rig that appeared at the start of my showreel."

Was there any one part of the reel you think gained you an interview?

"I managed to portray a range of rigging skills and a variety of different techniques within my showreel. With rigging not being so popular at my university, it was hard to seek critique and feedback. As a result I ended up putting my rigs up on Creative Crash (**creativecrash.com**) and using the feedback to improve them. I was given an interview at Blitz, which gave me a chance to show what I could do in a work-based situation. As well as completing the interview task, I provided a joint-based facial rig specifically for Blitz. I think it impressed them that I took the initiative to create something based on their feedback. »

Improve your showreel







Success story #2

BEN CANTOR,
JUNIOR 3D ARTIST,
MOVING PICTURE COMPANY

You studied at Escape Studios. How did that help when it came to putting your reel together?

Right from the beginning of the course, we started to view other people's work. We began to build a clear picture of what a successful showreel should look like and what kind of subject matter it should include. We were shown common pitfalls and advised that it's important to look at your showreel from the perspective of potential employers. If you're aiming to get into commercials, it can be worth incorporating a commercially viable project within your reel, such as modelling a branded vodka bottle.

What did you put on your reel?

My reel included an opening shot of my name and showreel projected onto the Tate Modern, a Mercedes van within a shot, a product shot of a bottle of Disaronno alcohol (no backplate this time) and a British Pullman train carriage within a shot. I chose the van because I wanted to demonstrate my modeling skills, and the bottle because I loved the texture of the glass – and it was a product shot. The opening shot was simply a chance to have some fun and demonstrate my camera tracking skills.

In retrospect, is there anything you'd do differently?

I would have planned my pipeline better, especially with my first project. I would advise keeping it simple. I lost a lot of time indulging in a couple of fun projects, playing with nCloth simulations and making smoke come out of the ground. However, without honed TD skills, these kind of projects are unlikely to make it onto your reel. It's easy to go off at a tangent.



This camera model is from a Panasonic project for HecticElectric in Amsterdam

05 Make a good impression

Slick tricks that entice people to play your reel are gaining in popularity – but can too much gimmickry blind employers to your true potential?

When it comes to strong presentation, the story doesn't end with the way that you put your reel together. Some creative types like to pay attention to the way that a reel is packaged. DVDs placed in sweet boxes, submissions wrapped up like Christmas presents, packs of postcards featuring stills from the reel accompanying the disc... ideas can range from the sober to the most shamelessly eye-catching. Tying everything up with a metaphorical bow (or a real one, for that matter) is never going to disguise any shortcomings on the reel itself, but might a little extra sparkle help catch the eye of a recruiter?

Patricia Kung at Animal Logic isn't so sure. "Having well-presented material is important, as it is a reflection of you. However, ultimately it is the quality of work on the reel or portfolio. I'd suggest keeping things simple rather than doing anything gimmicky. It's not that we don't like inventiveness, but sometimes there just isn't enough time or space for unnecessary packaging. And recruiters will feel bad if they just end up throwing out all the packaging that a candidate has spent time putting together."

Kung advocates forgoing creativity in favour of practicality. That means remembering to include an additional hard copy of your CV if you chose to put it on the DVD, with easy-to-find contact details. "Always include a hard copy breakdown listing of each shot from the reel, explaining exactly what you contributed," notes Karl Wickens. Remember to clearly label your disc, just in case it does get separated from the other paraphernalia you submit. Don't go using sticky labels, however. These have a habit of coming unstuck and jamming up DVD drives. And that really is no way to make a good impression.

If you do still feel the need to dress your reel to impress, consider instead lavishing your creativity on an online presence. By designing your own website, rather than simply using Vimeo or YouTube for hosting your content, you'll be able to add a little personalised gloss without necessarily getting in the way of the reel itself. Neil Gallagher suggests you still make some use of those online video sites, however. "Upload your reel to Vimeo or YouTube and put that on your website, rather than trying to stream a QuickTime yourself. That way, you don't have to handle the bulk of the bandwidth and risk running out. You can always offer a downloadable QuickTime for those who want to keep a copy."

With your own, purpose-built website, the practical stuff such as your CV, contact details and useful links



My showreel: Maxim Fleury, freelance character supervisor

"Whenever I make new reels, I like to include something personal. In this case it was an Akira bike (with Kaneda) and a spider-bot doing the dribble. I had done both as an exercise in modelling, texturing and shading.

"It took about a month to make this showreel. It's a lot of work to do in-between work, kids and life. I always enjoy it, though, and it makes me review my work. I feel this one is a bit long and maybe more focused on visual effects than modelling.

"The shots that seem to get the most reaction (or get me the most jobs) seem to be the little elves with green wings flying out of the girl's hair, and the dirt [illegible] which gets me quite a lot of [illegible]

"I get a lot of [illegible] coming out of the [illegible] and need [illegible]

Watch the showreel at 3dworldmag.com/reel

The CG elves appear in a Bijenkorf commercial created at The Ambassadors, Amsterdam

> "If you want to be an animator, there's little point showing your shader skills"
> Neil Gallagher, University of Hertfordshire

can sit happily alongside fancier things, such as stills galleries (including renderings from the reel at higher resolution, before and after images and non-CG art) shot breakdown explanations (perhaps even with image annotations), and site design that reflects your own artistic leanings. "If you have a very technical bias, it allows you to put scripts, plug-ins and examples online for potential employers to look at," suggests Lee Danskin.

Just be sure not to make any website so unwieldy that it becomes difficult to navigate or takes too long to load. And remember that an air of professionalism is still a must, whatever material you choose to offer on your site. "Websites that are quickly thrown together or out of date are never acceptable," cautions Danskin. "Good websites should be mature and business-like, rather than soapboxes for whatever you feel like ranting about."



Don't let gimmickry distract from the message you want to give

Improve your showreel







Success story #3

OWEN MCGONIGLE, MATCHMOVE ARTIST, DOUBLE NEGATIVE

How did you end up working at Double Negative?

Shortly after graduating, I was offered a runner position at The Mill. This experience helped me gain a better understanding of the VFX pipeline and production practices. Shortly after, I was contacted by Double Negative with a junior artist offer based on my showreel, which I gratefully accepted. Since joining, I've been working as a matchmove artist on John Carter of Mars.

What approach did you take with your showreel?

I showed how my graduate film progressed from initial concept sketches to final renders. This way I could show how the project evolved from my traditional art skills into CG animation. Wireframe turnarounds revealed low-poly meshes and demonstrated my knowledge of topology for animation. Shot breakdowns revealed how the final shots were composited together using multiple render layers. I also included some life drawing to show my traditional skills.

Was there any one aspect of your showreel that Double Negative responded to?

Because several of us had organised a group visit to Double Negative, we were fortunate enough to be able to present showreels personally to Karl Wickens and Vic Rogers. They were interested in my illustrative style and how that translated into my CG work.

Any advice for other artists?

Go for quality over quantity. A showreel doesn't have to be long and should consist of only your best work. Also, having some traditional drawings or paintings will help to convey your individual style as an artist.

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Our showreel: Assembly Studios

Ross Cunningham, creative director, says:
"The Assembly Studios showreel is a key tool for winning work. It's hard to qualify precisely which jobs are won directly from its impact; but we regularly play it at client pitches, and it acts as a fantastic ice breaker. Although we set out to do something new with every opportunity, many clients like the peace of mind that you've successfully completed something similar. We cut the production in two days, and we update it every six months or so to keep it fresh and relevant."
assemblystudios.co.uk



06 Stay focused

In an area rife with clichés, just how does an artist create showreel material that stands out from the crowd?

There's a simple dilemma facing any artist looking to make an attention-grabbing showreel. On the one hand, there's a need to show some artistry and originality. On the other, there's a desire to show that you can tackle the kind of work that professionals are likely to deal with on a day-to-day basis – the kind of work that invariably recycles the same themes, reference points and artistic styles. When the industry is rife with similar-looking CG animated cartoons, identikit CG monsters and rather samey high-res architectural wonders, just how do you prove you can follow the crowd *and* put a new spin on things?

Andrew Daffy says it's not always the subject matter you pick that matters, but how you choose to treat it in your work. "There's nothing wrong with putting a dragon on your showreel, so long as it has an original design or looks like it stepped straight out of a Harry Potter movie. The work can't look at all corny. It needs to be quite sophisticated, or at least handled really well."



If you can't resist familiar themes, try to find a new twist on them for your reel

This is perhaps the biggest challenge. It's not the use of stock creatures or scenarios that's wrong per se, more that limiting yourself in this way means you're going to be compared to every other similar model or sequence that the recruitment team have ever seen. "It's best if you avoid the clichéd things, such as orcs, space marines, ninjas and anything taken directly from Star Wars or the Pixar films," advises Neil Gallagher. "And if you are going to model a car, then at least choose a model that doesn't feature in every other showreel, like the modellers' beloved Audi TT does."

Artists pitching for work in the arch-viz or gaming industries arguably have the toughest challenge of all in finding the balance between standing out and fitting in. Architecture is necessarily a field where forms and room configurations are almost always familiar. As Lon Grohs says: "If you're going to show me yet another kitchen, living room or bathroom, it had better be spectacular!"

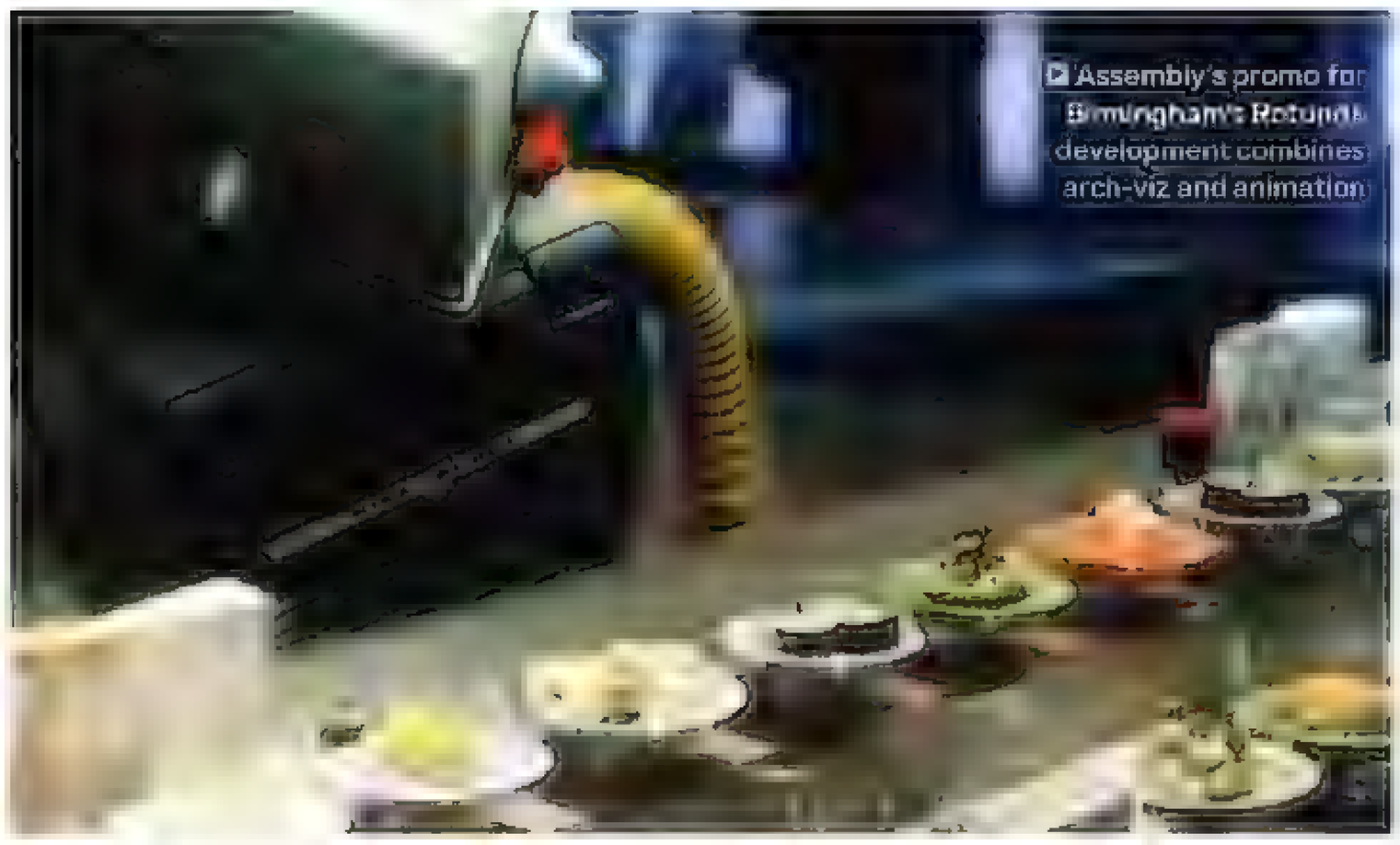
The gaming industry, meanwhile, pretty much thrives on cliché. Certainly, some games developers are working to push the artistic boundaries, but with most games still bought by adolescent males, there's still a surprisingly large number of artists out there called upon to deal in those aforementioned orcs, space marines and ninjas.

Sometimes it's not even standard industry clichés that applicants must try to avoid, so much as over-familiar showreel concepts. "I've seen far too many reels with characters sitting down at a table just talking," admits Marco Marenghi at Sony Imageworks. "Sure, there's

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Assembly's film for Ian Simpson Architects showcases its arch-viz work



Assembly's promo for Birmingham's Returns development combines arch-viz and animation

> Start with the best piece, end with the second best. You're only as good as the weakest piece in your showreel, so make sure that it's still very good
>
> Neil Gallagher, University of Hertfordshire

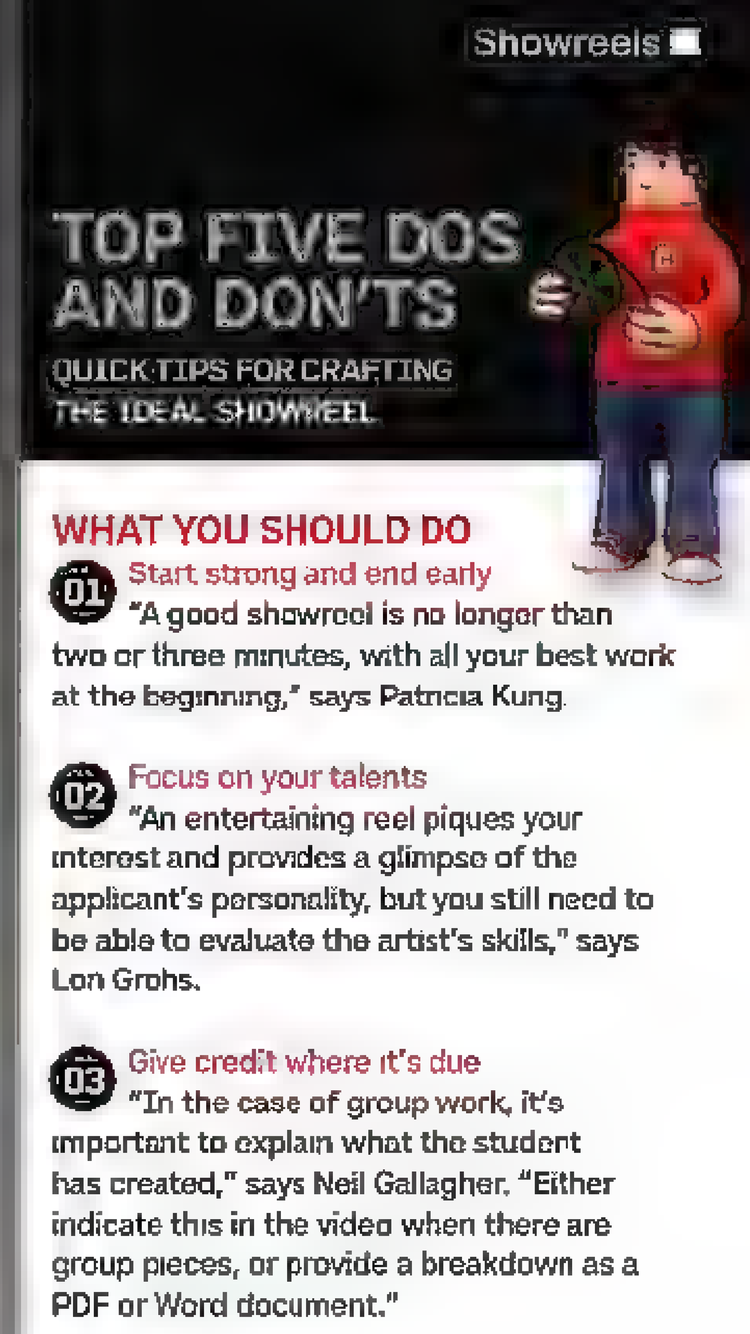
some nice act ng subtleties and nuances, but I'm more likely to show interest in an art st that has attempted a d ffic t piece like runn ng, jumping and climbing than an artist that solely concentrates on acting pieces."

When it comes to displaying mode ling work, Lee Danskin says two key bugbears are showing st s against a black background and using turntables. "When has there ever been an advert that used a turntable? They don t work and it isn't creative."

"If it's something that's been done a thousand t mes before, you need to find some way of present ng t so that t appears fresh and nteresting," concludes Ga agher "The idea showreel should be technically impressive, artistically stunning, and so entertaining that people who view it will actually go and forward t to their friends and co leagues."

And f you can manage that, then who knows, it may just be that the recruiters are the ones who get in touch with you

For more over-used ideas to avoid – or at least find a way to re-invent – check out the 3D World A-Z of Clichés at 3dworldmag.com/cliches



WHAT YOU SHOULD DO

01 Start strong and end early
"A good showreel is no longer than two or three minutes, with all your best work at the beginning," says Patricia Kung.

02 Focus on your talents
"An entertaining reel piques your interest and provides a glimpse of the applicant's personality, but you still need to be able to evaluate the artist's skills," says Lon Grohs.

03 Give credit where it's due
"In the case of group work, it's important to explain what the student has created," says Neil Gallagher. "Either indicate this in the video when there are group pieces, or provide a breakdown as a PDF or Word document."

04 Show your workings
"Provide a shot breakdown, showing what your contribution was and the software used," says Patricia Kung. "If you're applying for a technical role, it shows you have a good creative eye too."

05 Match your reel to the vacancy and the stud o
"Some people don't even know what job they're applying for," says Trond Greve Anderson. "There's not much point in a studio like ours looking at models of orcs."

WHAT YOU SHOULDN'T DO

01 Get hung up on new techniques
"It's not the technique you use that matters: it's the final result, and whether it works and looks good," says Lee Danskin.

02 Start a rave
"Don't worry too much about editing your shots to music. Reels are reviewed without the music the majority of the time," says Karl Wickens.

03 Be clichéd or offensive
"Be wary of the obvious bad stuff, including anatomically enhanced characters of any description (normally elves), cars and motorbikes that are shiny and new, guns and robots built with generic spheres and tubes with a shiny shader," says Lee Danskin.

04 Overdo the packaging
"Don't spend too much time making your packaging look better than what's on the reel itself," advises Marco Marenghi.

05 Take it personally
"Don't get attached to materia. that ultimately doesn't showcase your best work, even though you have an emotional attachment to it," stresses Patricia Kung.

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WIN HIGH-END 3D WORKSTATION WORTH £1,595

David Penfound's demanding workflow relies on the power of ATI graphics cards

David Penfound and FirePro

David Penfound creates huge illustrations using 3ds Max and ZBrush, rendering in mental ray and compositing in Photoshop. The image At The Waterhole (above) was created for an 18,000-piece jigsaw puzzle. "Much of my work involves stills that are printed to a very large size," says David. "Puzzle clients want detail on more or less every piece. Scenes can be huge. I'm currently working on one that will be printed at 2.5 x 1.5 metres at 300 dpi. I don't think that any one texture is under 8K – and one elephant is 32,000 pixels high."

With this amount of data, David relies heavily on his computer to be fast and reliable, and also to support multiple monitors. "I use a 30-inch landscape monitor, flanked by two 24-inch portrait monitors where all the menus and palettes are permanently open. That means that I don't ever have to spend time opening, minimising and closing them."

After using a FireGL card for a number of years, David recently upgraded to FirePro. "My investment in AMD technology has made all this possible, and has been well worthwhile," he says.



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This pro graphics card is included with your prize

The shape of things: understanding topology

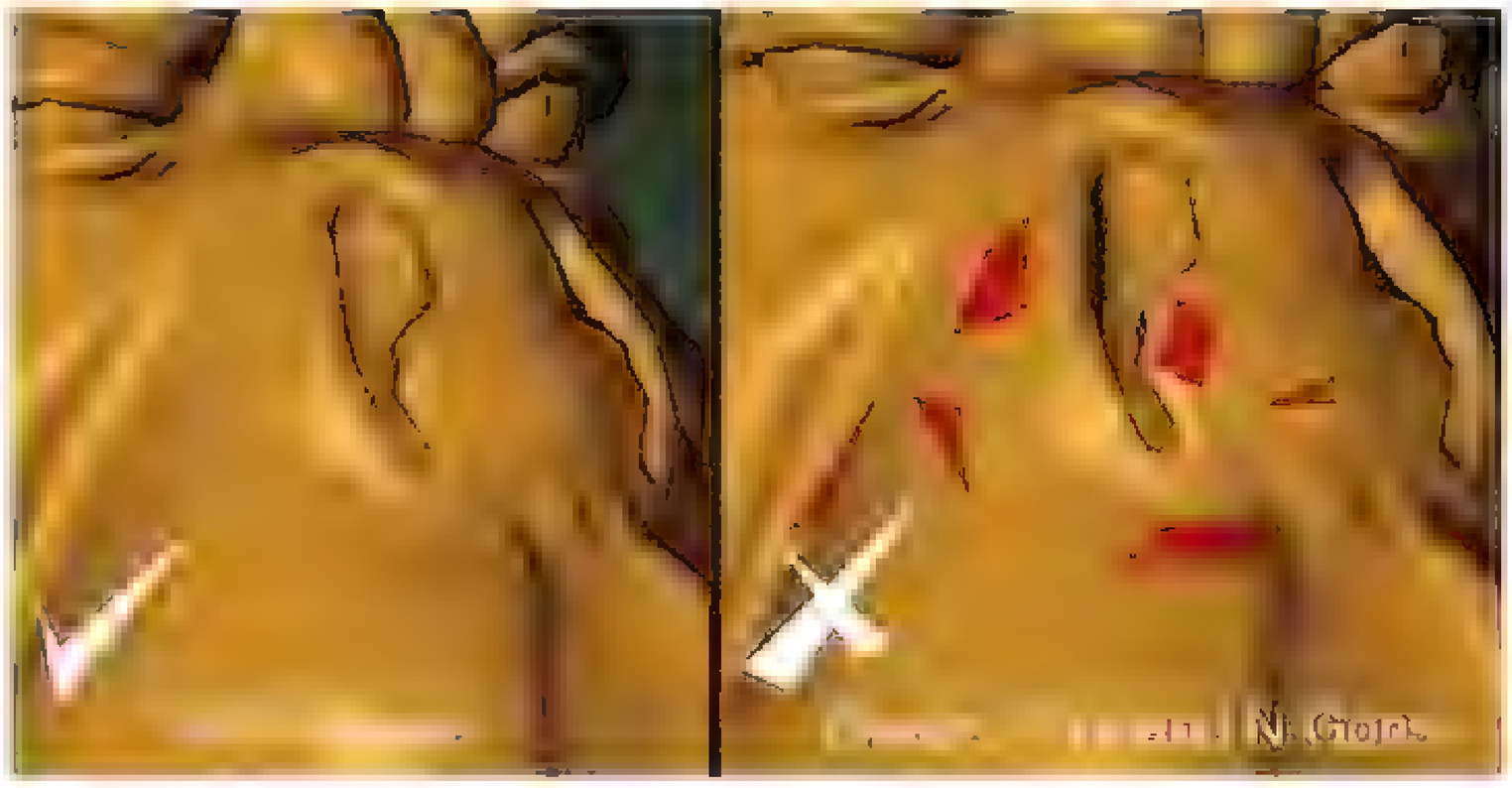
Discover the basics of building meshes that work in any situation. Good topology lies at the heart of subdivision modelling, says **Glen Southern**: ignore it at your peril!

You constantly hear the terms 'edge loops' or 'polygon flow' in 3D modelling circles. These terms are part of mesh topology: how a 3D model is created using polygon faces, edges and points, and the right or wrong way to do it.

One of the best reasons for building a good understanding of the subject is when you need to pose or animate your model in a 3D package. If the topology isn't good, you can end up with serious issues when you subdivide the mesh, try to deform it with bones or joints in a 3D package or try to put it into a 3D game engine. Each of these tasks may have different requirements, but if the topology is right from the start, you can prevent most issues from ever occurring.

Good geometric topology is one process within the 3D modelling methodology known as subdivision surfaces. The history of subdivision modelling goes all the way back to the late 1970s. It didn't really hit the mainstream until the mid-1990s, with Pixar developing the process further using RenderMan and seeing it implemented in Geri's Game, A Bug's Life and Toy Story 2. Software developers started to add the algorithms to their packages: Maya, Mirai, 3ds Max, LightWave and a whole host of programs were getting NURBS (non-uniform rational B-splines) or offering their own implementation of subdivision surfaces.

The basic idea behind subdivision modelling is that you use a low-polygon control cage to drive a subdivided version of itself. This gives the computer less to do graphically and enables you to create smooth organic shapes that can be deformed with ease. From subdivision surfaces come the flow of polygons (edge loops or face loops, for example) and the term geometric topology.



Modelling only with four-sided polygons means fewer potential problems when you animate or pose your model later on

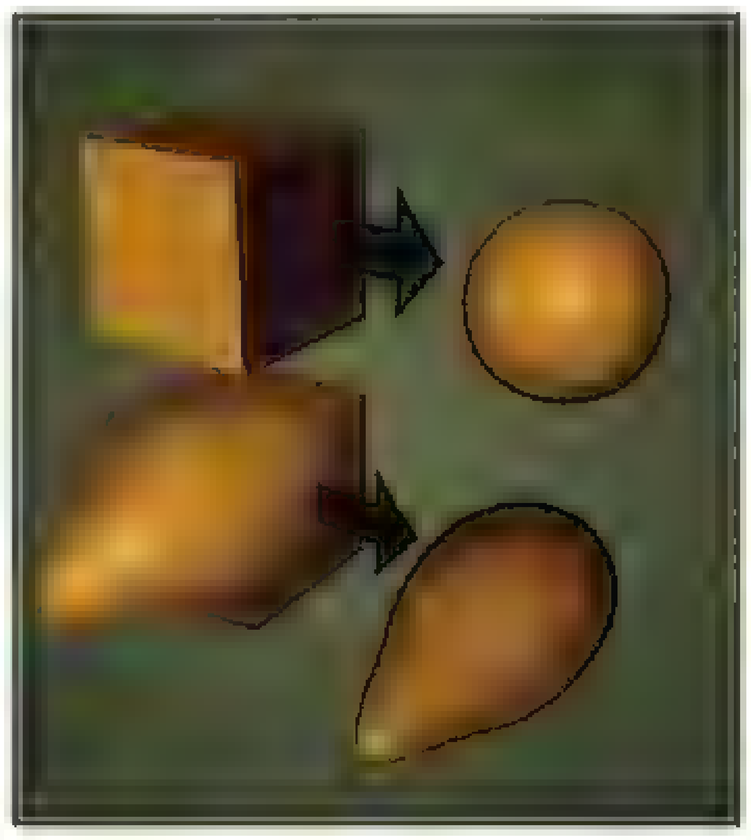
> If the topology isn't good, you can end up with serious issues when you subdivide the mesh or try to deform it with bones or joints

WAYS TO MODEL

There are several ways to create 3D polygonal models with good underlying topology. First, of course, you can build the model with accurate topology in the first place, building up good edge and face loops and by using a set of basic subdivision modelling rules. This can be done with box modelling, point-by-point or extrude-edge modelling, for example.

The second method is to build or sculpt a high-density mesh using sculpting tools in a program like Mudbox or ZBrush (or have a maquette scanned in), then take it into a 3D package that allows you to retopologise the mesh. This frees you to focus on creativity and form while you sculpt, then focus on technical precision afterwards.

In recent years, other ways to generate polygon meshes have emerged. Pixologic, for example, has introduced a process in ZBrush called ZSpheres that uses ed table spheres: when strung together with connectors, they enable you to build up a ZSphere frame that can be switched to polygons. When the frame is ready, it can be converted to a true »



Subdivision uses simple shapes to represent more complex forms, enabling you to build and render complex forms without taxing your computer

WATCH THE VIDEO TUTORIAL

Follow Glen's workflow with his video at the 3D World website

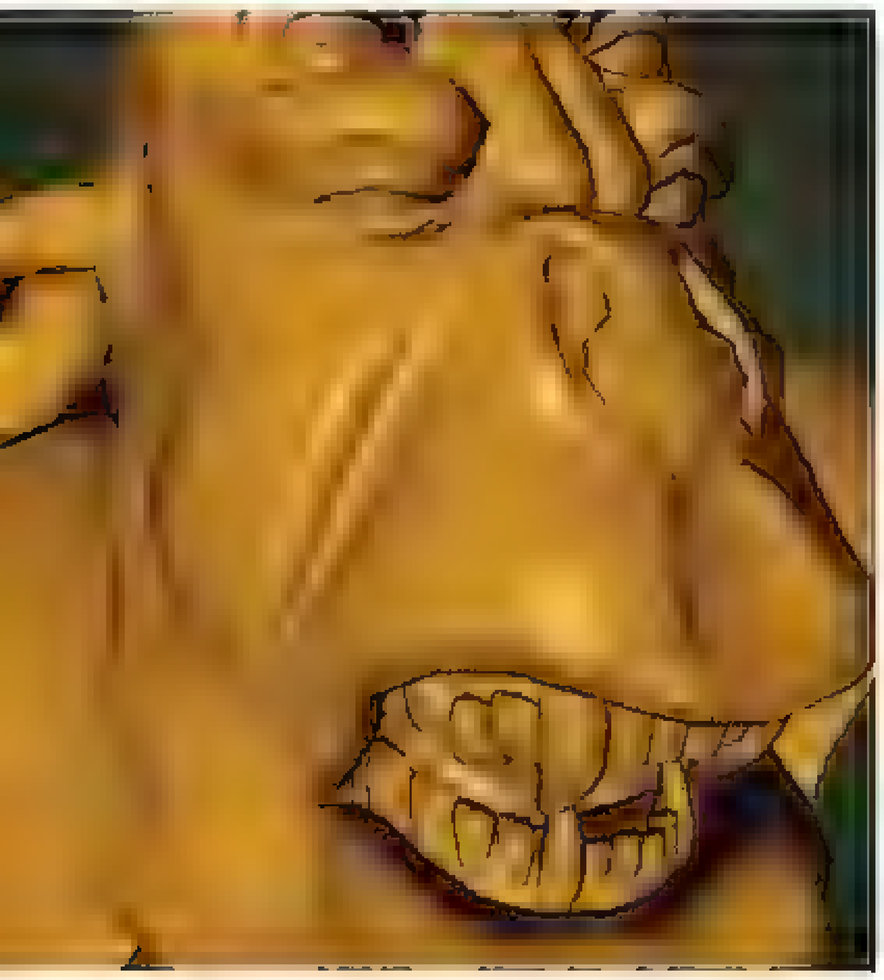
3dworldmag.com/143



Tips & Tricks #1

Try to only use quads (four-sided polygons). Use tris (three-sided) only if permitted on the project you are doing

> "A big part of proper topology is having good polygon flow all the way around the model"



Successful topology relies on achieving a good polygon flow, where faces form loops that follow the model's form in a logical way

polygonal mesh. 3D modellers work in different ways and affect topology differently, and you need to understand where and when to use each method to the best advantage

THE DNA OF SUBDIVISION

Subdivision surface models are built up with faces, edges and vertices that create the overall form and smoothed out using subdivision algorithms if needed. Hard-surface modelling relies less on this, but as an organic modeller, you should fully understand subdivision principles.

Try to build your model using only four-sided polygons, or quads. During the modelling process, you inevitably create three sided polygons (tris) and more than four-sided polygons (n-gons). As you finish a section of a character model, try to end up with no n-gons and the bare minimum of triangles. Some jobs allow you to use triangles – but if you learn to model using only quads, you'll be better prepared for the harder tasks. There is nothing worse than finishing a model with a limited polygon count and finding out that you have a single triangle at the end of a finger. n-gons are easy to remove: they will always reduce down to a number of quads, or to a quad and a triangle. So never leave them in your model!

If you use only quads, you generally know how your mesh will look throughout the production process to come. If you have a mix of triangles and quads, the mesh may have issues when you subdivide or at render time. It can lead to unsightly pinching at certain points on your model or artifacts when you render, for example.

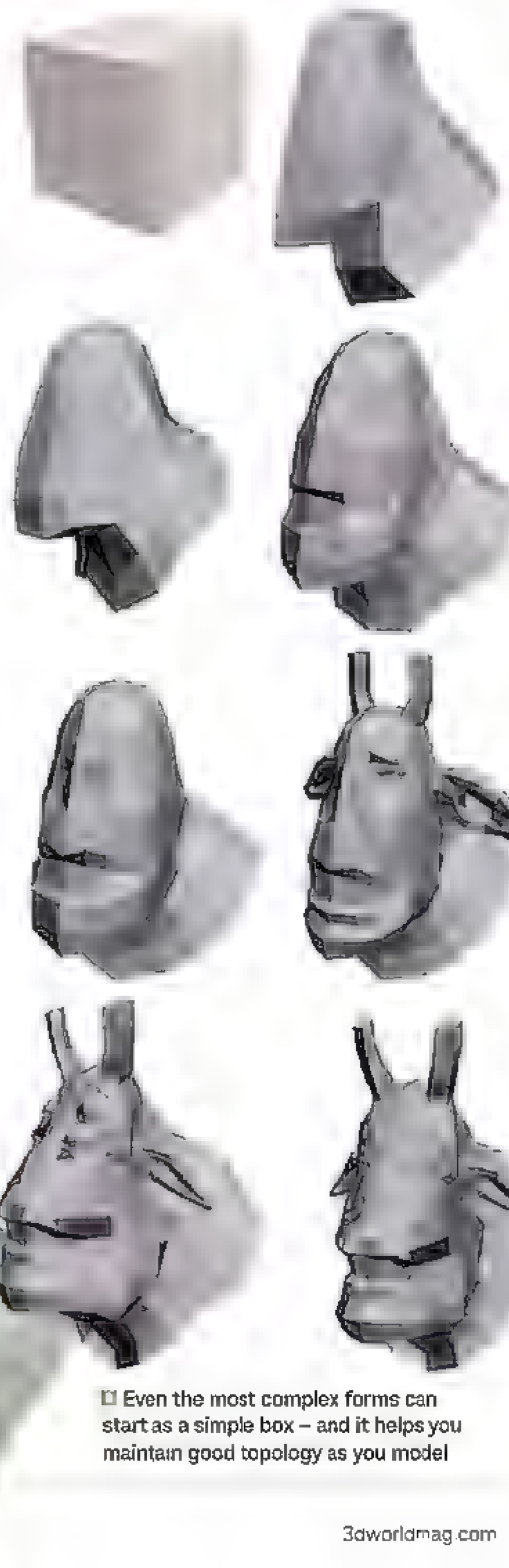
Even if you use quads throughout your model, there are still some risks. Where more than four edges come together at a point, you can get a pole. These are inevitable, but you should be aware of where they end up. A pole on the flat part of a cheek, for example, shouldn't cause too many issues for you. If that same pole ended up on the fold of the cheek, though, you could end up with problems later on. Try and avoid poles with more than five edges coming into them: they can be very unpredictable at render time.

Topology also affects your UV maps for texturing. Take a look at a well-laid-out UV map: you will see clearly defined edge loops that travel around the model. Good edge loops and therefore better UV maps allow for better texture painting. Seams on the texture map become more logical, and you can paint along the flow of the polygons and match to muscle groups.

A big part of proper topology is having good polygon flow around the model. Polygon loops are used in all subdivision modelling, but are more often associated with creatures and characters. When creating a head model, you would model face loops around the eyes, the mouth, the jaw line and so on. If the face loops flow around the model in the way that the underlying muscle groups work, the mesh should deform that way too. Wherever you have joints that will deform or bend, aim to keep the polygons flowing around them. Knees, elbows, ankles and wrists are all fairly straightforward: each is generally just a tube, which by its nature is made up of good loops. However, once you get into shoulder joints, the pelvis, wings, claws and so on, you need to plan topology in a little more detail.

If you're modelling a basic toy-like character and you want to model the arm coming off the shoulder, it can be made up from a simple extrusion out to the side. When that model is an anatomically correct shoulder joint with biceps and triceps, the planning is a little more complicated. The muscle groups must flow together correctly, but the muscles need to allow you to bend the arm down without issues.

> "If you use only quads, you generally know how your mesh will look in the production process to come"



Even the most complex forms can start as a simple box – and it helps you maintain good topology as you model

Get into the habit of colouring the key loops in your model structure for better comprehension

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ESSENTIAL METHOD #1: Box-model a head

Get good topology right from the start

Box-modelling is a term used for many modelling techniques. It simply describes any type of modelling where the artist starts to build up the model from a basic primitive shape such as a box. Alternatives include modelling from splines using points, polygons or edges, extrusion and reference images in viewports. Generally, box-modelling is done in the perspective view and doesn't always need to have reference imported into the background. It can be regarded as a more organic way to model, and can be seen as a bottom-up approach. I'm using Silo here, but the principles apply broadly.

01 Shape a head

Start with a basic cube. Human heads are roughly symmetrical, the process for creating them in most modelling packages makes use of symmetry function. Add a few splits around the cube and lower the top. Now start to refine the cube into a head shape with a neck, ears, nose and jaw.



Get the basics of your character down before adding detail

Tips & Tricks #2

Don't lose track

n-gons in your mesh as you work. Clean up after yourself and the whole process is easier at the end

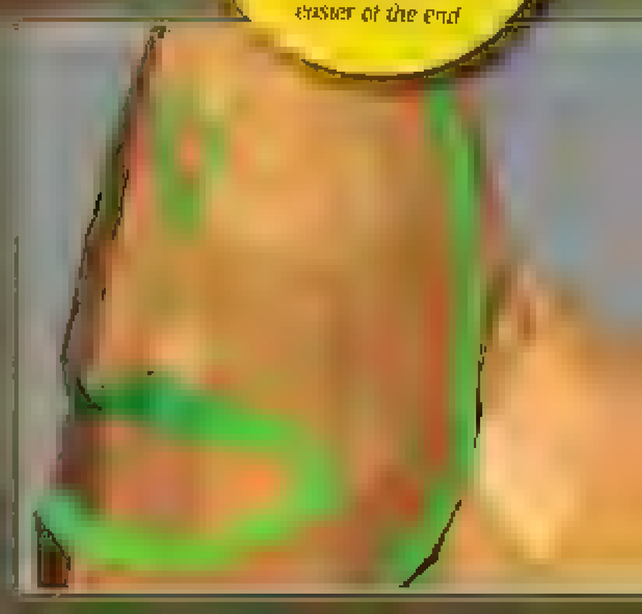
02 Create your basic forms

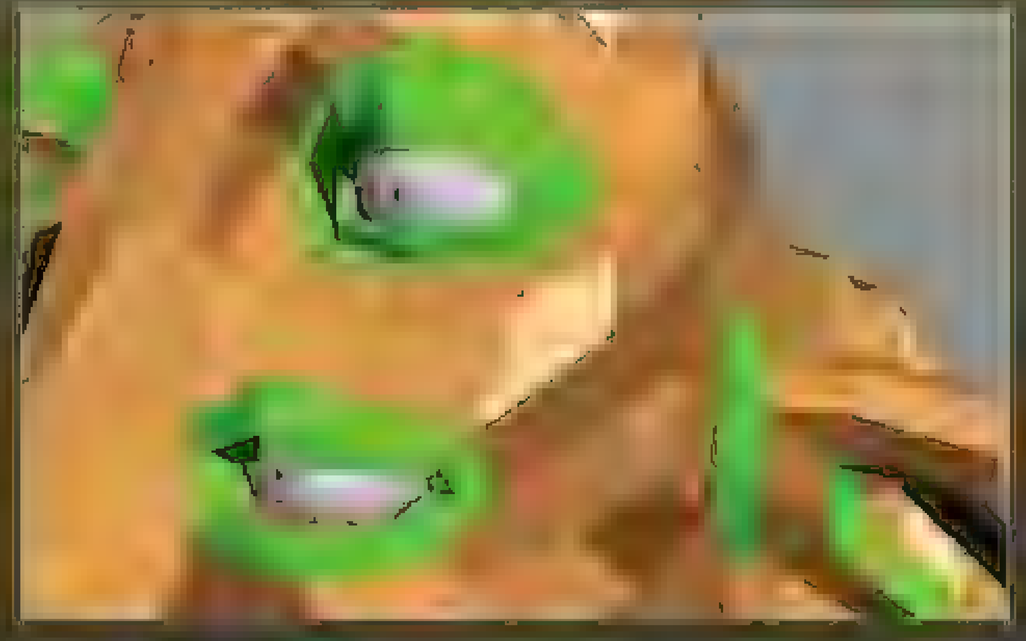
Work out where the major face loops – eyes, mouth, nostrils, ears and jaw to a – will be placed in your model. Select the faces in the mouth area and extrude inward, forming a mouth with a full edge loop all the way around. To help myself understand edge and face loops better, I typically colour the major loops as I go.



03 Shape the jaw line and nose

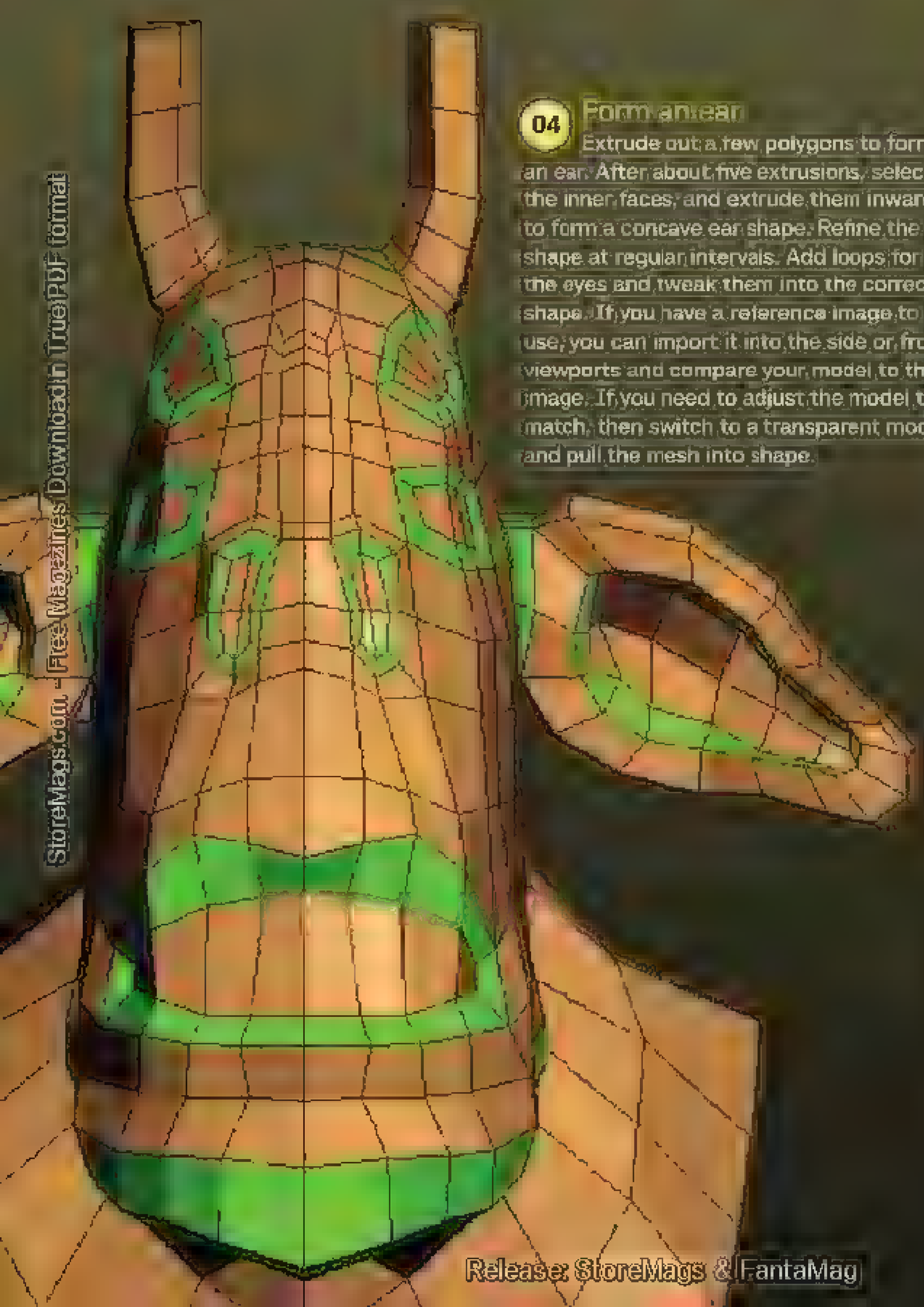
Add loops in the nostril area in the same way as the mouth. You are only looking to place the relevant loops and establish the overall form of the model. Try not to focus on any detail yet. Using cut, edge-deletion, edge-spinning and split tools, make sure that the jaw has a line of polygons that go from the chin, around the side and right up to the forehead, and that the loop defines the jaw line.





04 Form an ear

Extrude out a few polygons to form an ear. After about five extrusions, select the inner faces, and extrude them inwards to form a concave ear shape. Refine the shape at regular intervals. Add loops for the eyes and tweak them into the correct shape. If you have a reference image to use, you can import it into the side or front viewports and compare your model to the image. If you need to adjust the model to match, then switch to a transparent mode and pull the mesh into shape.



05 Add eyeballs

Create a sphere and rotate it 90 degrees forward. This will form the eyeball. Move it into one of the eye sockets. For a four-eyed model like this creature, duplicate the sphere and move the copy into place in the lower eye socket. Using soft selection or a magnet, pull the eye geometry out and around the sphere. Tweak individual points into position to create upper and lower eyelids. Focus on getting a nice, rounded upper eyelid and a tight corner.



06 Add detail

Using cut and split tools, add more detail around the eyebrows and the nostril area. With box modelling, try not to leave any n-gons or triangles behind as you model. You will have to make them as part of the process, but try to clean up after yourself. Don't move onto a new area if you have left any problems behind.

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07

Keep refining the main form

Start working on the cheek fold that runs down from the nostril and under the corner of the mouth. This will require lots of cutting, splitting and deleting. In some modelling packages, you can use spin edge or spin quad to change polygon flow. If in doubt, delete edges and cut new ones.

08 Create the inner mouth

Select the faces inside the mouth area. Colour them a deep red to make sure you can easily distinguish them. Extrude the polygons inwards and scale them down slightly, then extrude again and scale them up. Tweak the inner mouth to make it the correct shape to receive teeth and gums. If needed, hide one side of the mesh and adjust the inner mouth to suit. If you mess up the centre edges, you can realign them numerically or by scaling them to zero on the X axis.

09 Add teeth

Make the gums from a box, then extrude outwards and backwards like a horseshoe. Add horizontal splits and smooth the shape, then duplicate it for the lower set. Using a primitive shape, begin to make the canines, incisors and molars. Move each tooth into place and use soft selection to position them correctly. Tweak as needed. When you have a set of teeth made, move it into the head and scale it correctly.

Tips & Tricks #3

When box modelling, don't add detail until you're happy with the form. The more detail you put in, the harder it is to make changes later.



10 Finishing touches

Keep tweaking the overall mesh until you have a smooth head shape that matches your reference. Keep referring to the reference image as needed, and ensure you maintain the volume and silhouette.

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ESSENTIAL METHOD #2: Retopologise a sculpture

Work over an imported mesh to ensure an ideal structure

Tips & Tricks #4

Limit the amount of poles (vertices with more than four edges joined) you have. Place any poles you must have in discrete places, not on folds or seams

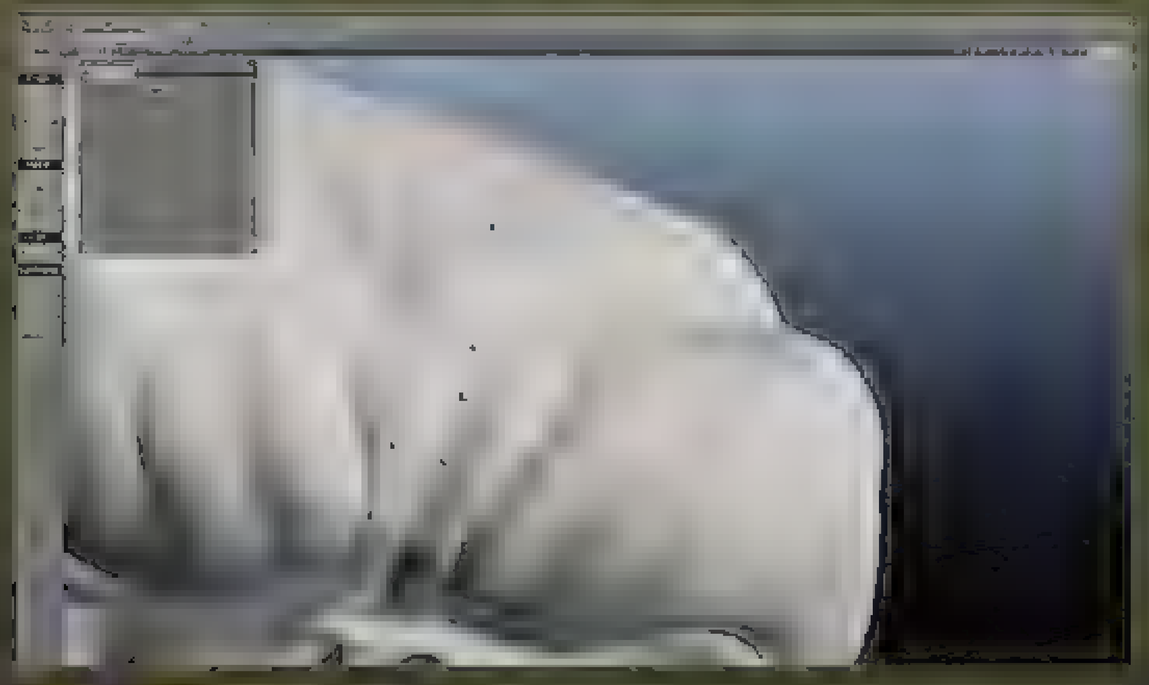
Retopologising is the process of recreating geometry over the top of an existing high-resolution model. If you have a model that has been scanned digitally and brought into a 3D program or is from a sculpting package and is made up of millions of polygons, you may need to retopologise the mesh to generate a lower-polygon version with good topology suitable for rigging and animation. There are now lots of software packages that help you do this, including ZBrush, Silo, Topogun, 3D-Coat and Maya. I'm using 3D-Coat here, but the principles apply broadly.





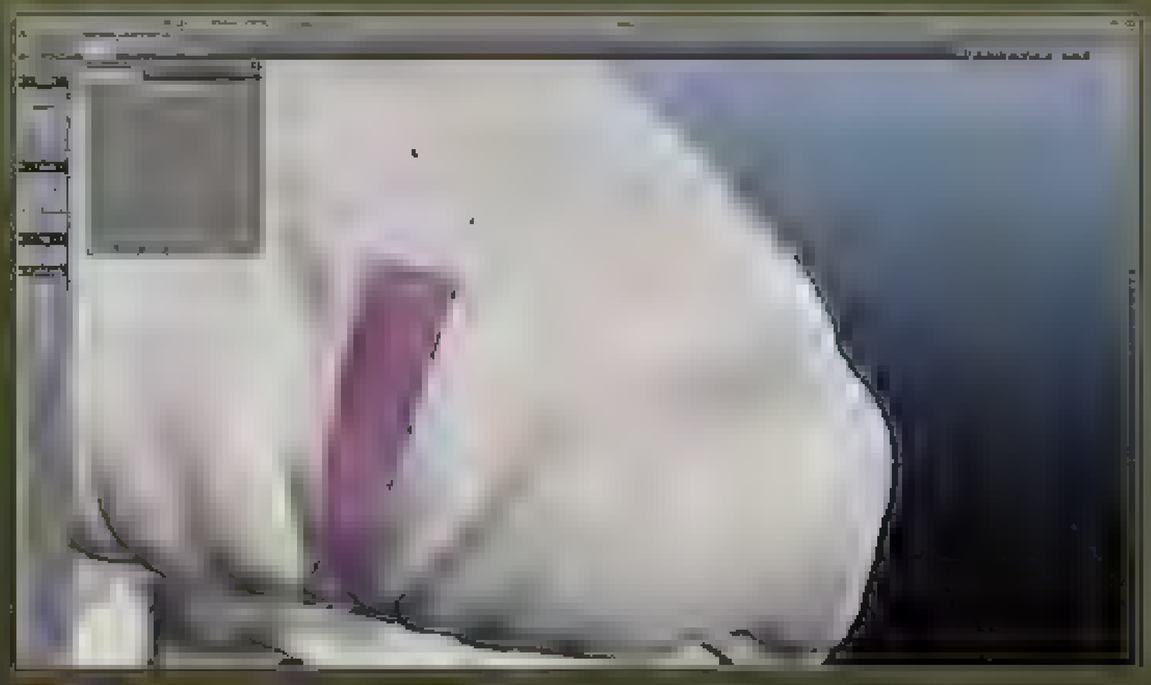
01 Import the model

Load up the high-frequency model using your 3D package's import function. If available, try the auto-retop import feature, which is useful if you have a dense mesh and just need it to have a lower polygon count without getting too concerned over accurate topology.



02 Add geometry

Starting at the centre of the forehead, add points in a grid shape up and towards the back of the head. Try to visualise how you want the polygons to flow and place the points accordingly. When you have the makings of a good face loop, go back over the area and make the point into solid polygon faces. This will give you a good line of polygons to start from.



03 Finish the forehead

Work your way along the flatter area of the forehead, adding polygons in the same way. Where the forehead is indented or creased, try to add in more detail. As you work around the forehead, you may need to adjust some of the polygons you have already placed for more precise placement. Use a brush tool, or move individual vertices for more accuracy.





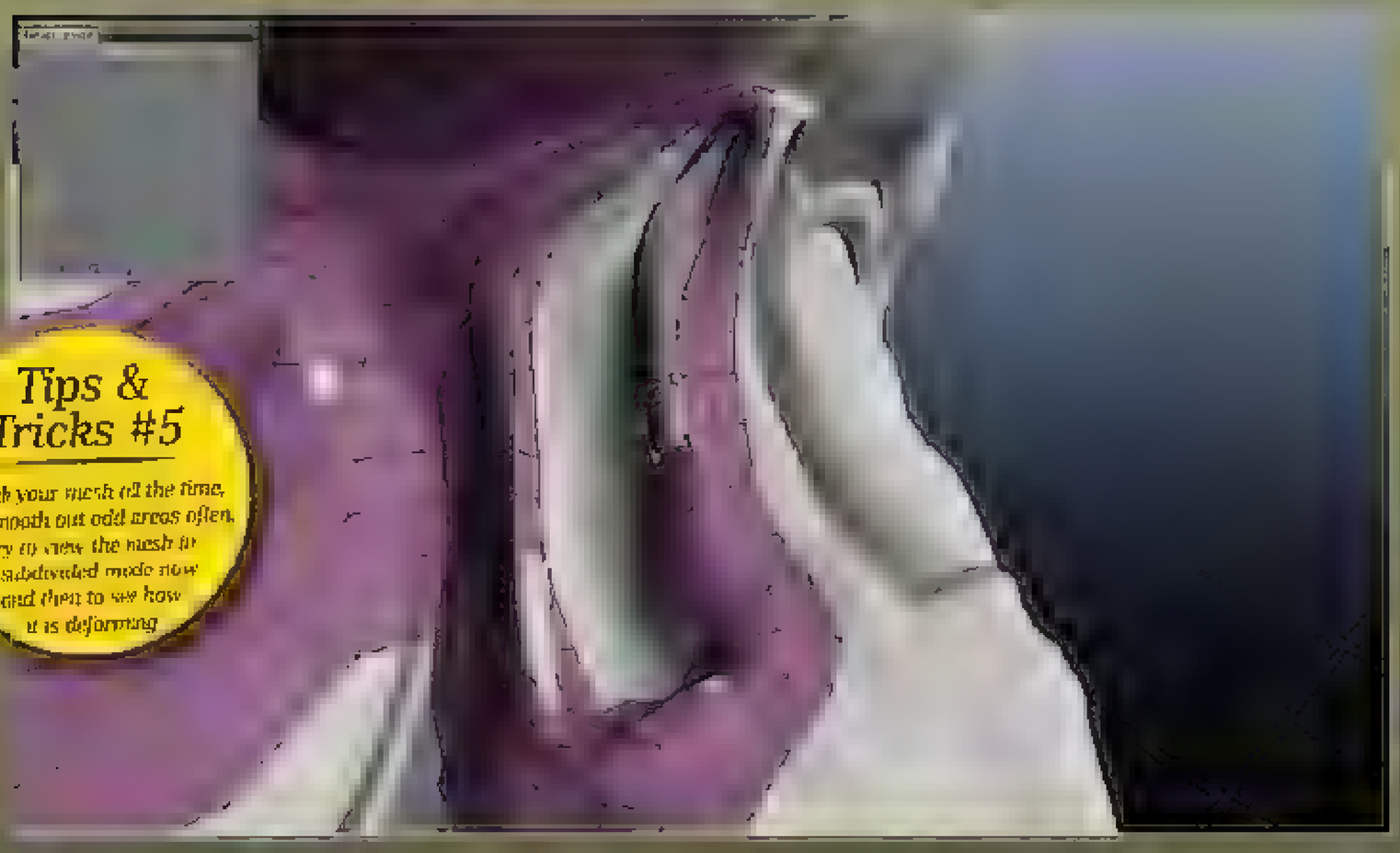
04 Eye loops

After blocking out the bulk of the forehead, begin placing points in a loop around the eye. It's crucial to get the topology correct here, so take your time building up concentric circles, then tweak them into position. Make sure that the loops flow smoothly around the eye and are evenly spaced. As you work out from the centre, you will reach a point where the eye loop meets the forehead. Join the two pieces together so you have a single mesh. Tweak the vertices so the polygons flow up and over from the eye to the forehead.



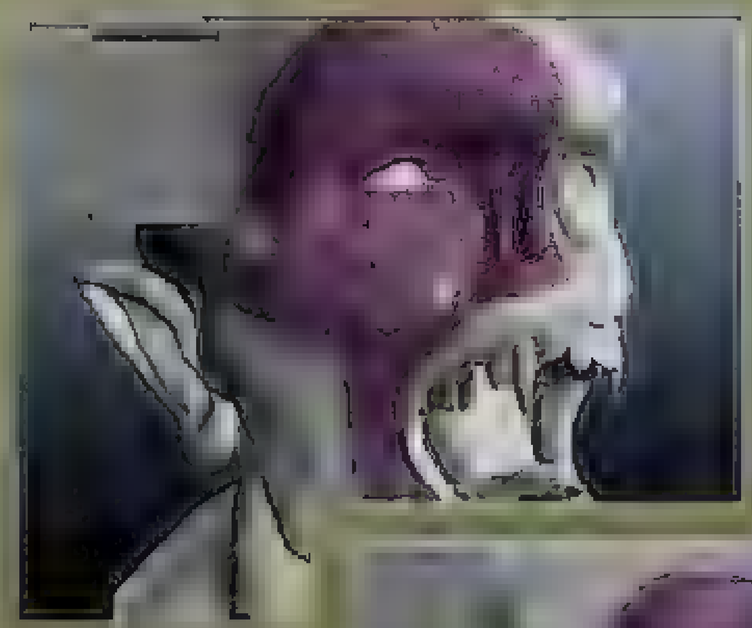
05 Split rings

If you find that you need more polygons in a particular area, use your package's split rings tool. This allows you to add a line of edges across a run of polygon faces. This is where having good polygon flow is crucial, as the split will now run along predictable lines. Hold the mouse cursor over the area running from the corner of the eye to the outside edge. A line of edges appears; when you click, the polygon loop will be split evenly down the centre. »



Tips & Tricks #5

Tweak your mesh all the time, and smooth out odd areas often. Try to view the mesh in a subdivided mode now and then to see how it is deforming





06 Create edge loops

Once you have defined the eye and forehead, move onto the nose area. Using your package's create quads tool, you can select an existing edge and build a new polygon face with a couple of clicks. Repeat the process again and you have another. Keep doing that around the nasal cavity area, creating a face loop all the way around and back on itself. Make sure that you create a closed loop and that the loop does not turn off into a different direction.

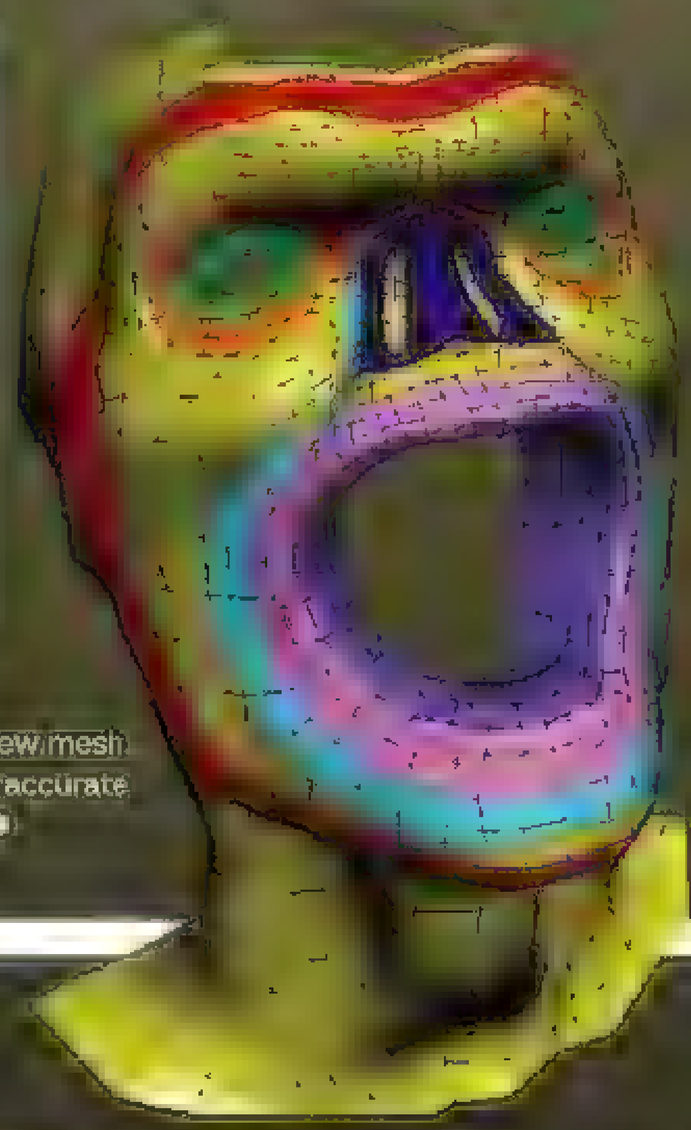
07 Create strokes

Another powerful tool in some retopology toolboxes is the ability to create strokes. With this, you can draw lines or splines on your mesh and they become the new geometry. You can add splines and split the stoke you have already laid down. When you're happy with your grid, commit the changes and the lines become new geometry. This can then be attached to the existing mesh.



08 Export the mesh

The newly created geometry can be exported as a new mesh. In the screenshot, you can see how the new topology has accurate polygon loops that link all the major facial parts together.





The final mesh follows the form of the original, but with better loops for animating

Topology jargon

Your handy reference as you learn

BACK FACE CULLING
Where the back of a polygon face is made non-visible.

EDGE (or polygon edge)
One side of a polygon face, with a point at each end.

EDGE LOOP
A series of edges connected by four edged vertices. At each vertex, the loop continues along the edge that does not border a polygon shared by the previous edge.

EXTRUDE
A useful tool in most 3D modelling packages that is usually performed on a selected face or edge. It pulls a new polygon out from the parent and creates new faces and surrounding geometry as a result.

FACE LOOP
A series of faces bordered by two edge loops.

GEOMETRY
A virtual plane in 3D space that usually takes the form of a grid.

KNIFE
A tool that can that slice through geometry with a straight line.

FACE (or polygon face)
A component of a polygonal model that is comprised of three or more points and edges.

MANIPULATOR
An on-screen device for moving, rotating and scaling a selected object. It usually sits at the central pivot point of an object and has a different colour for each axis.

N-GONS
A polygon with more than four sides. Not all modelling programs support n-gons; to make a model as compatible as possible, it's best to limit the number of n-gons used in a model.

NORMAL (or surface normal)
A vector that extends outwards from the centre of a polygon face to denote the way the polygon is facing.

PIVOT POINT
A point on or in an object that acts as a pivotal centre. If the object is rotated, it revolves around the pivot point.

POINT
Another name for vertex; one component part of a polygon face. Points are connected by edges to make the polygon.

POLE (or star)
A vertex that connects four or more edges.

POLYGON
A geometric shape generally made up of points, edges and a face.

RETOPOLOGISE
Create a new polygon model over the top of a high-polygon mesh, with the aim of achieving better underlying topology and fewer polygons.

SMOOTH SHIFT
A version of an extrude command, which pulls a selected polygon or edge out from an existing component.

SPLIT POLYGON
A command that allows a modeller to add new edges by dividing polygons, usually by clicking on a point or edge then moving to another point or edge and clicking again.

SPLIT FACE LOOP
A command that splits a line of selected faces in two.

SUBDIVISION SURFACES
Subdivision modelling enables you to create a polygonal model that acts as a controller containing the structure of the smoother, subdivided one. Only the smoothed version is taken into account at render time.

TOPOLOGY
The way that polygonal geometry is created in loops.

TWEAK
A process of manually moving vertices around to get them in the correct location to define shapes correctly. This is one of the most often-used processes in subdivision modelling.

VERTEX
A point in 3D space that, along with edges defines the perimeter of a polygon face.

WIREFRAME
How geometry is viewed when a model's polygon faces are hidden, making the model appear as though it's made of wire.

XYZ
Generic names for axes in 3D space: typically X for left and right; Y for up and down and Z for in and out. Each 3D package has its own way of presenting these; a few swap Y and Z from the definition given.

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3D Showcase

The month's best new commercial 3D projects

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Project d'Leedon

Studio Sixtrees

Internationally renowned architect Zaha Hadid recently designed this 36-storey condominium for leading Singapore building developer CapitaLand. The site is 78,000 square metres, comprising 12 semi-detached houses and seven towers that each contain 1,703 apartments.

Sixtrees was approached by CapitaLand with the design brief and awarded the job of creating 17 rendered images of the project. It was able to start by taking an early model from Zaha Hadid Architects, created using Rhino, and converting it in 3ds Max. The team used V-Ray for the final rendered images.

"The scene was millions of polygons, with extensive use of 3D plants and trees, to keep up with international standards," says Sixtrees creative director Max Lim. "However we still rendered the plants in layers for flexibility."



Projects

This month's round up of new commercial work includes an army of destructive bugs and new housing complex in Singapore













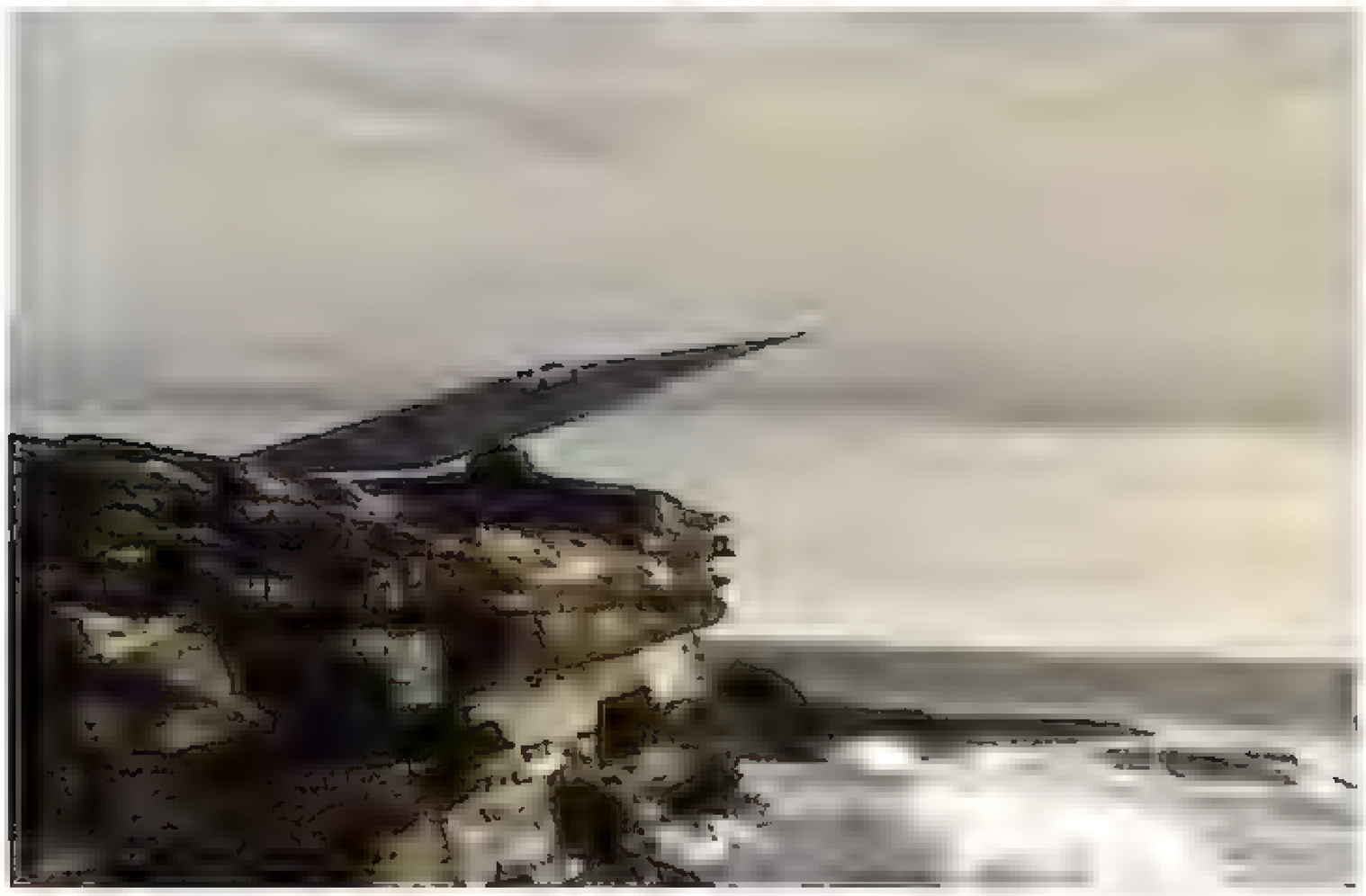


Project: McDonalds 'Apple Tree'
Studio: Kompost

The latest McDonalds spot features illustrative 3D animation completed by Kompost. Working in collaboration with Duck Studio on the storyboarding process, Kompost took on the entire project from concept art to final composition.

The studio encountered many technical challenges in production, including the rendering of fur and feathers, creating a natural environment and animating the changing seasons. Using Maya 2011, RealFlow and Shave and a Haircut, it managed to overcome these issues one by one. "In the very first shot, great care had to be taken in the rigging for the growth of the tree from just a seed to a fully matured apple tree," explains Kompost VFX supervisor Kenneth Poloński. "Every small detail of the tree had controls for growing, translating, moving and scaling. The placement of every branch for each shot was a time-consuming task. The animation of hundreds of leaves doesn't just happen with the click of a button."
kompost.tv

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Project: Lexus 'A Beautiful Contradiction'
Studio: fuelVFX

Director Matt Murphy and producer Ben Scandrett Smith of GoodOil Films approached fuelVFX with the brief for this new Lexus spot, designed to showcase the car's handling skills. A pre-viz animatic was provided by Murphy, which fuelVFX combined with a story reel to determine how many shots would require a CG car. The Lexus was built in Maya and rendered with Maxwell to enable seamless transitions between real and CG vehicle. The environment and platform in the live-action shoot were recreated in 3D to give artists more control over the set.

"A lot of attention was paid to the edit, and we worked closely with the guys at GoodOil to keep it live through our production schedule," says fuelVFX supervisor Andrew Hewen. "We continually fed them shots to find the right balance between the sports mode – where the car moves dynamically, fighting to gain control of the platform – then finding a moment when the car slows the platform for a beat to switch to eco. The Lexus gracefully gains control, leveling the platform for the final few shots."



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Project NFI 'Be A Dad'

Studio Make

In an attempt to target people on a more emotional level, The National Fatherhood Initiative has collaborated with Make for a 60-second spot that aims to simply convey its core message. The video features four different scenarios of fathers with their children, all of whom enter a fantasy land created through CG.

The project was lead by the studio's creative director Danny Robashkin and director Mike Nelson, who used a combination of 3ds Max, After Effects and SynthEyes to realise each scene. "The biggest challenge was to overlay the existing backgrounds with the fantasy worlds created by the kids' imagination," says Robashkin. "Then we had to dissolve them away in an elegant manner. Some clever masking and particle effects are really all it took to blend between the two."

makevisual.com







Project: Terminix 'Flying Monster'
Studio: Dvein and Vando Studio

With the concept of a monster attack established by agency Publicis Dallas, Dvein began to explore characters it could develop for this new Terminix spot. Sticking to its signature organic mode designs, it passed illustrations over to VFX studio Vando, which was then responsible for the whole CG element of the project. To achieve the final composition, Vando used a combination of Maya, ZBrush, V-Ray, Nuke and the DMM plug-in for Maya to assist with the simulations.

"The destruction scenes were the most technically difficult parts of the project," explains Vando CG supervisor Javier Leon. "There were many houses being destroyed by monsters, and the creatures themselves were also pretty complex because of displacement maps, shaders, hair and the sheer number of them! Nuke provided a solution to the composition of the many layers that we rendered. V-Ray is a huge step forward in rendering within Maya: it makes the whole lighting process easier, and it's also very fast."





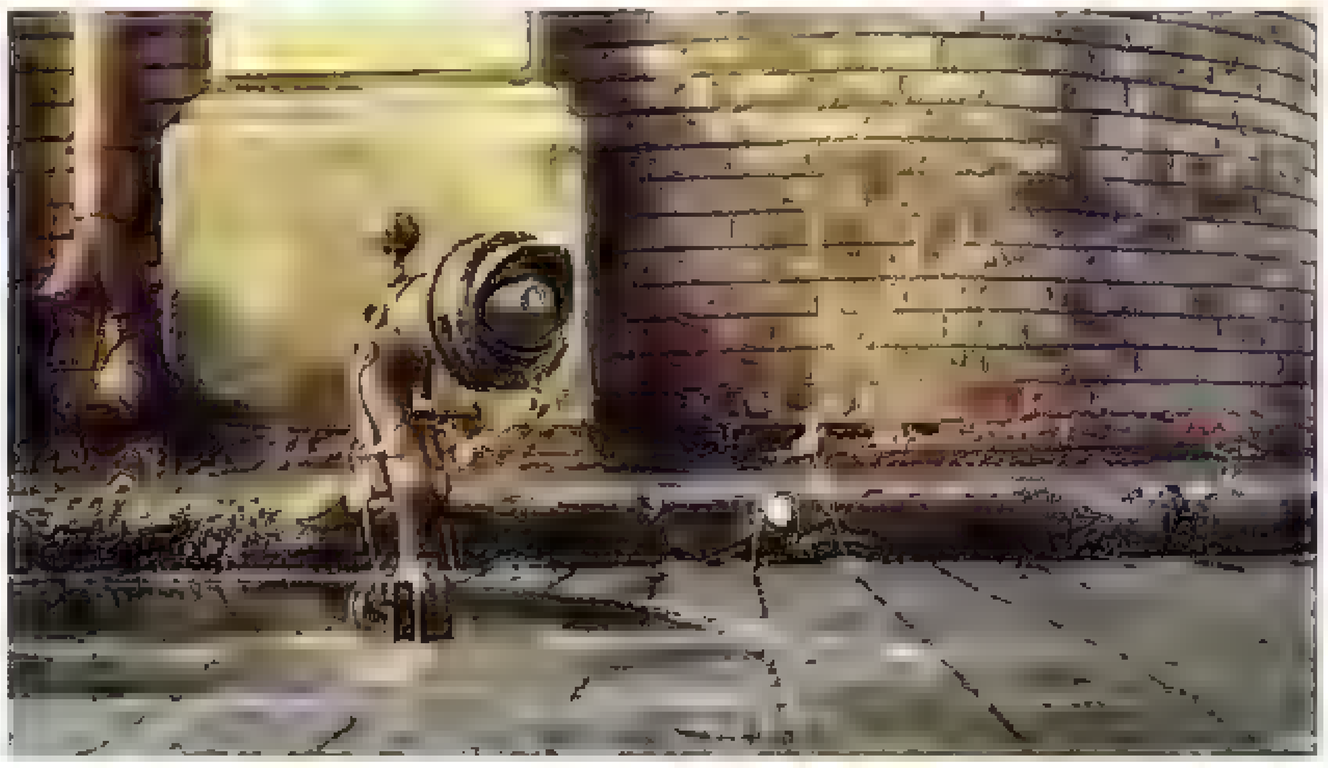


Project: Canal Odisseia 'Premio'
Studio: Dvein and Vando Studio

The Spanish and Portuguese documentary channel Odisseia worked with Dvein to create a powerful brand using the concept 'See your world differently'. The result was this spot, featuring a complex 3D CG periscope. It was designed and modelled by the studio using 3ds Max and Maya before being passed on to Vando Studio, which completed the rig, animation and final composition. There were many challenges involved with this project – for example, animating the many different parts of the periscope to build the entire character and creating the textures for the design.

"One of the key elements and most challenging parts of the project was creating lots of realistic rusty textures," says Vando CG supervisor Javier Leon. "High-resolution pictures were taken of real objects because we were super-close to the periscope. V-Ray shaders and lighting were important to achieve the desired look, but Photoshop is still our favourite texture-editing tool."

dvein.com, vandostudio.com







Project: Citroën 'Dominoes'
Studio: Psyop

The new Citroen spot features its new model driving through different environments that fall together with a domino-like effect. Made with a mixture of live-action and CG, each domino has a different terrain and is linked to the next one by the road and the car driving on it. Psyop used Maya, RealFlow and FumeFX to achieve the effects.

The close-ups of the car are mainly live-action combined with matte-painted backgrounds, the remaining shots are CG, including the snow environment. VFX supervisor and 3D lead Chris Sage explains: "At the time of the shoot and at the location, on the Spanish side of the Pyrenees, it was early fall, so there wasn't any place where snow-covered mountaintops were accessible. To create the diversity of climates we needed to sell the idea of these self-contained domino environments, we combined projected matte paintings with additional particle and fluid effects to add additional details."

psyop.tv

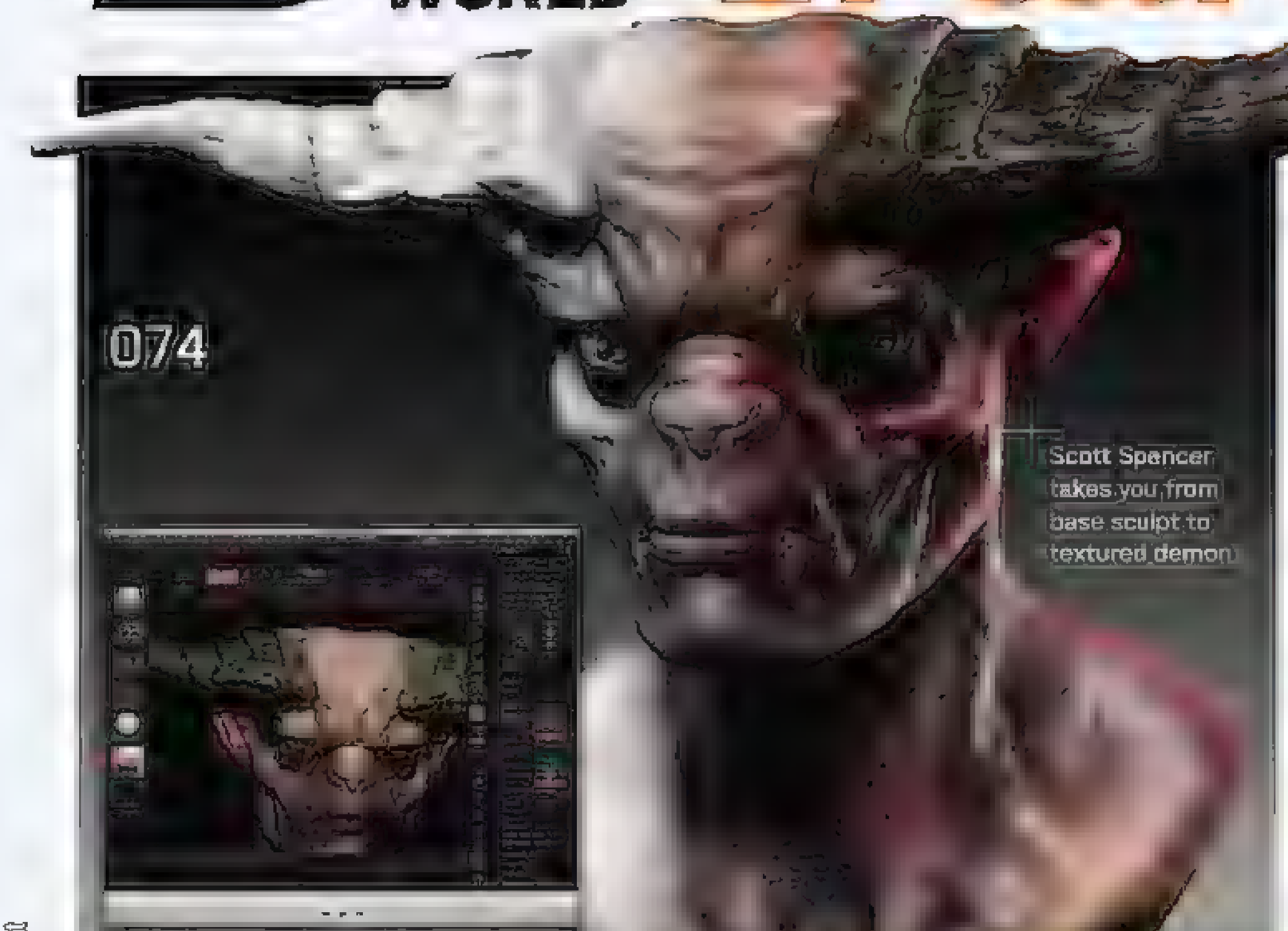


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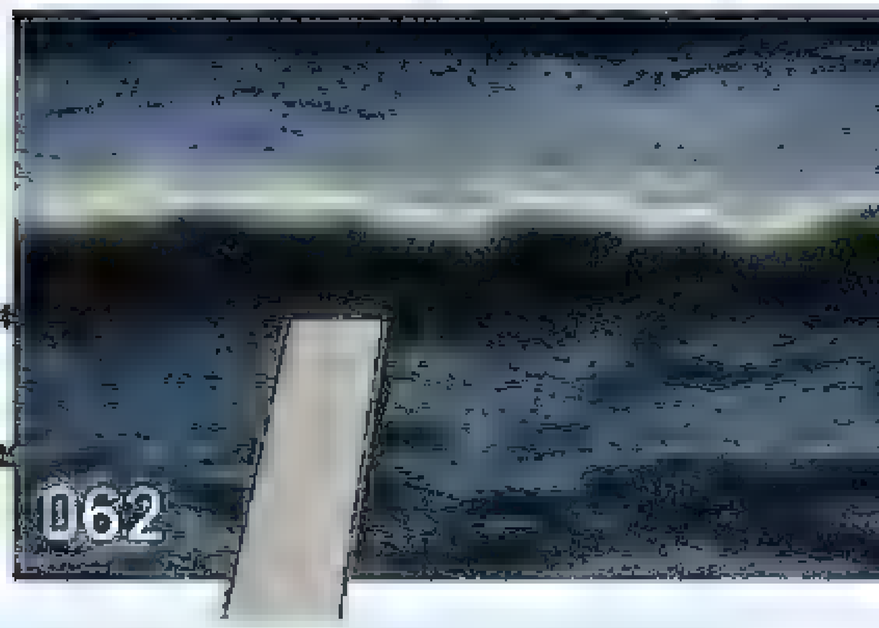
068 **Create a low-poly game weapon**
Phil Nolan presents his workflow for modelling and painting game props

074 **Paint a demonic creature in ZBrush**
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Learning: Large-scale simulation in RealFlow

RealFlow Animation

FOR
RealFlow 5

ALSO REQUIRED
Maya

TIME TAKEN
1 month

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About the author
Florian Koebisch is a CG artist and RealFlow expert based in Germany. He is currently working on his own short film project using RealFlow and Maya.



This scene by Florian Koebisch simulates a sea crashing against a pier



Create a stormy sea in RealFlow

Explore large-scale water simulation and interacting with objects as Florian Koebisch shows you how to set up an ambitious oceanic animation with the help of Maya

Several years ago, simulating ocean swells was a task only the biggest studios could handle. Developing fluid simulation pipelines and getting the appropriate hardware was an expensive and time-consuming endeavour. Nowadays, fast multi-core processors and off-the-shelf software solutions for fluid simulation are available to everyone.

Without a doubt, simulating large bodies of water like an ocean shore with swells still takes time and careful attention is required to end up with the kind of simulation you're looking for. In this tutorial, you'll learn how to set up a large-scale fluid simulation in RealFlow5 using its Hybrido solver, to make yourself familiar with the techniques you need for creating similar animations. We'll also cover the process of getting the data into a 3D package for rendering.

In the first stage, you'll set up a basic scene in Maya and see why it's important to have some ditches in the ocean ground plane. Then you will move over to RealFlow, discovering how to set up a large-scale container with a so-called Channel setup and how to have your emitters produce nice big swells. In the subsequent stages you will add in the additional elements for the simulation: surface displacement, splashes, mist and foam. Finally, you will create a mesh, then import all the individual elements into Maya and prepare to render them using RealFlow Render Kit.

Keep in mind that fluid simulations can be resource-intensive, taking both large amounts of processing power as well as hard drive space. Simulations can take hours depending on your settings and container size.

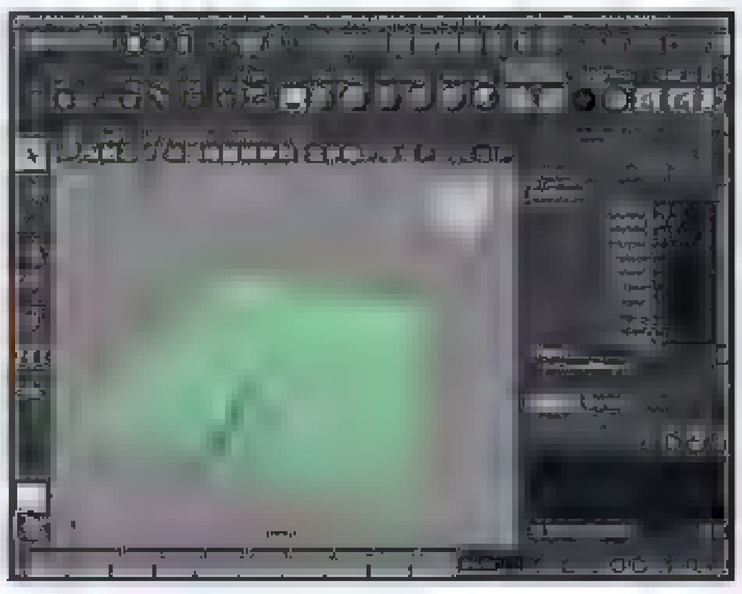
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Follow Florian's complete workflow with the video on the 3D World website
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STAGE ONE

Setting up the scenery in Maya

First, you need to plan what you want to achieve in the project. I was thinking about a pier, shot from a helicopter perspective during an incoming storm, with swells crashing against the pier. For this, I need some geometry my waves can interact with, so I modelled a pier and created a ground plane. The ground plane needs to have some ditches and knolls to create turbulent currents in the fluid that's interacting with it; otherwise the ocean might look boring. Keep an eye on your polygon resolution: the more faces your object has, the longer the simulation will take.



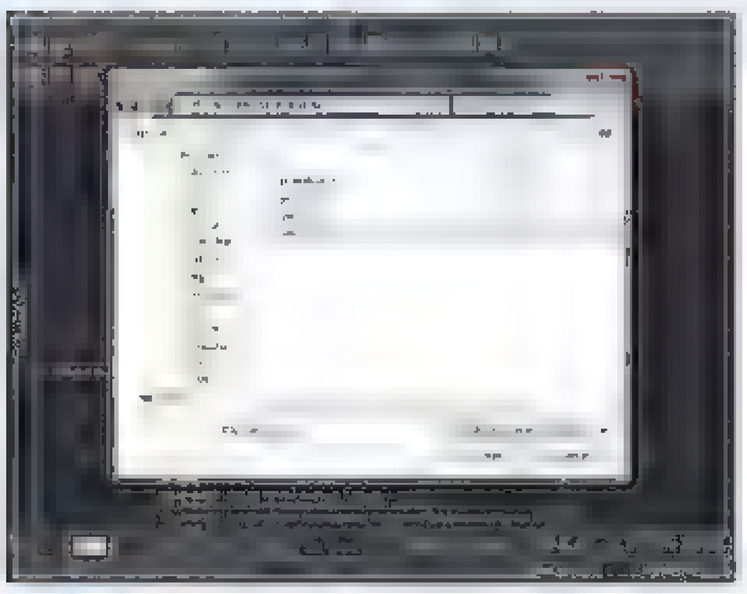


01 Open the start scene

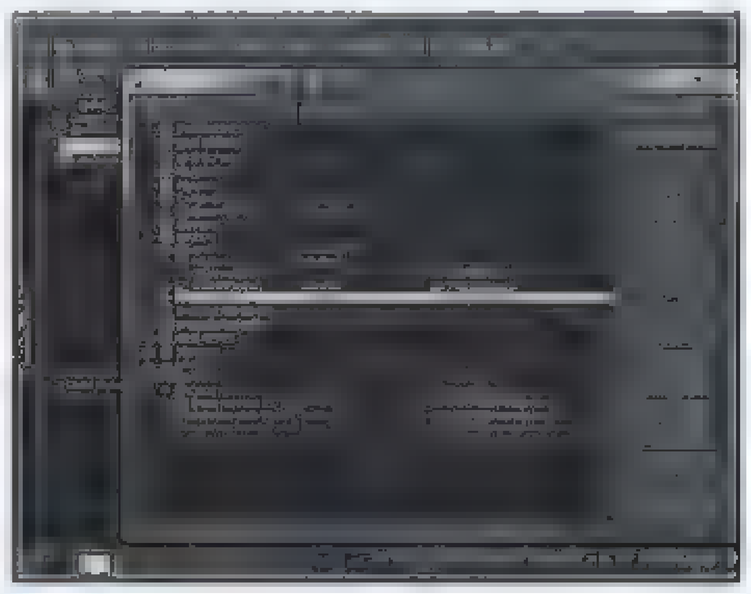
In Maya, open startmb from this tutorial's scene files. If you're not using Maya 2011, select File > Open Scene > Options box. Tick Ignore Version: now the scene will also open in previous versions of Maya. The scene features a pier and a ground plane. If you prefer to create your own scene, model to the same scale as my scene.

02 Create a RealFlow project

Start RealFlow and create a new project using the Project Management dialog: enter your desired Project Name and Location, then click Create A New Project. Keep an eye on disk space: this simulation will be using about 200GB. Fluid simulations typically use large amounts of disk space; this one is no different.







06 Import the objects

Import ground.sd via Import > Import Object. You'll import the pier as a Mult Body. This option is better when dealing with higher-resolution geometry, and gives you the opportunity of creating a rigid body animation with it, using RealFlow's Caronte rigid body dynamics solver. Select Edit > Add > Object > Mult Body and select pier.sd

07 Group and rename

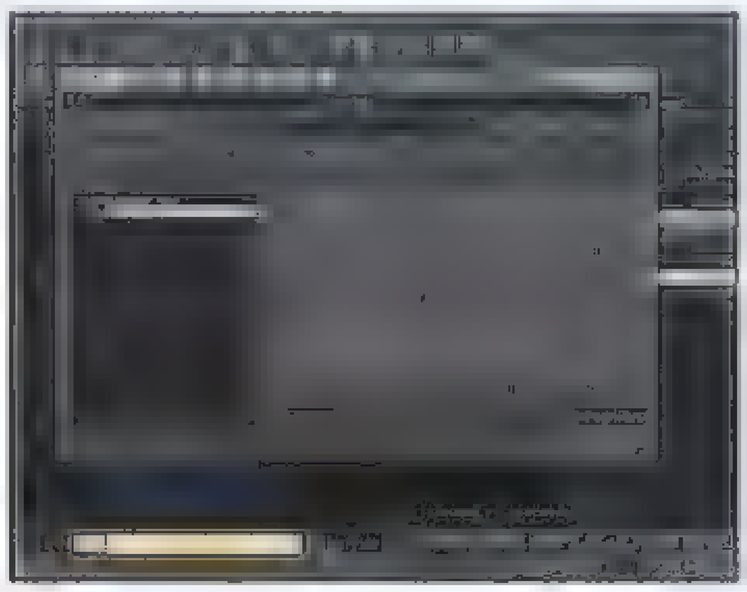
Right-click in the Nodes pane, select Add and then untick Add to Global Links. Delete everything from the Global Links panel by selecting it and pressing [Delete]. Select the objects you imported in the previous step, then right-click and select Group. Select the group you've just created, then right-click and select Rename; name it **SD**.

08 Export Central

Rename your pier object as **MB_Pier**, so you know it's a MultiBody. Open the Export Central dialog by pressing [F12]. Under Objects, untick Animation (*.bdc): since you're not using rigid bodies in this simulation, you don't need RealFlow to write a BDC file for every frame simulated







11 Create the wave emitter

Select the smallest of those newly created cubes placed on the far side of the pier, then select GridFluid Menu > Create Emitter. In the new Emitter's Node Params panel on the right side, the selected cube should be listed under Object. If not, double-click on Object and select the geometry. Rename the emitter as **GridFluidEmitter_Wave.**

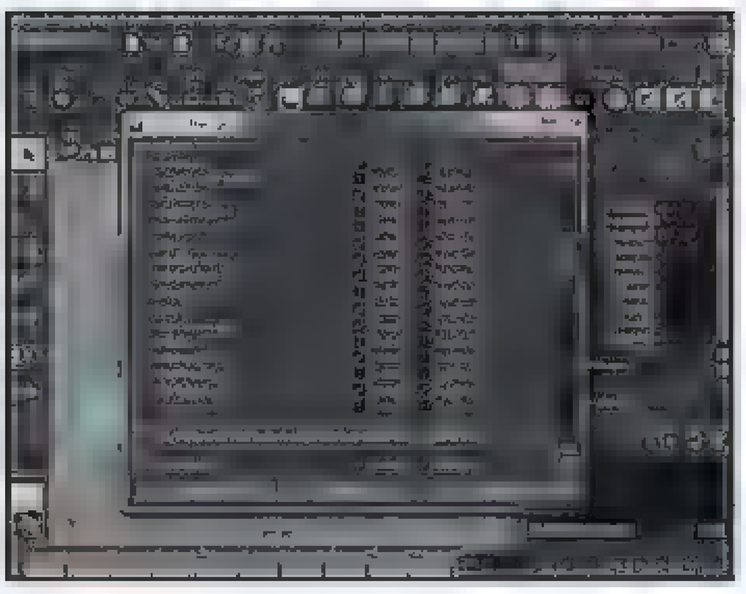
12 Create the other emitters

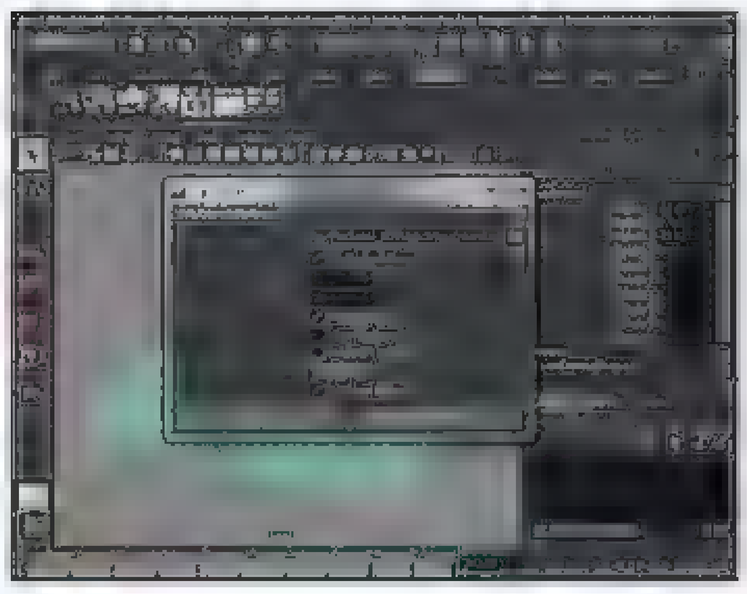
Create two more emitters: one for each of the remaining cubes. Name them **GridFluidEmitter_Main** for the middle cube and **GridFluidEmitter_Rest** for the cube by the pier. Group the emitters in the Nodes pane and name the group **GF_Emitters**. Now select GridFluidDomain01 and drag that into the Exclusive Links panel. Drag all the GridFluidEmitters onto this node in the Exclusive Links panel.

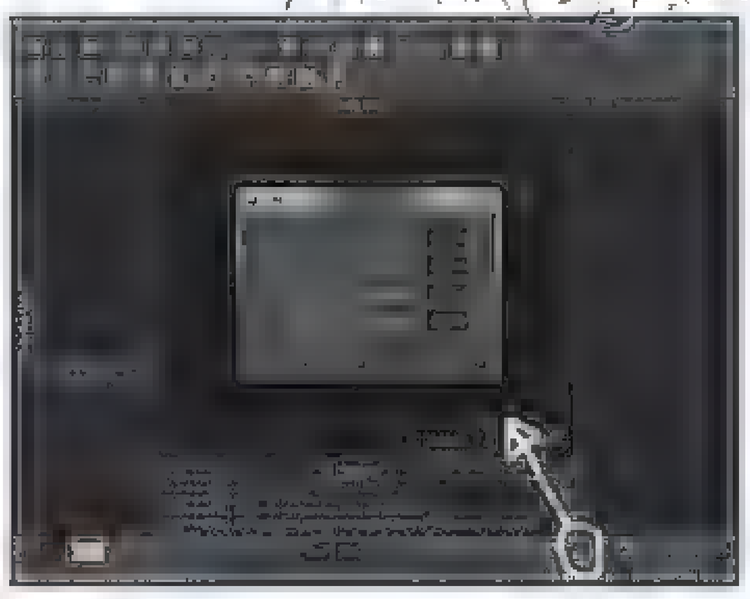
13 Set up the wave emitter

Select GridFluidEmitter_Wave. In the Node Params, set Stream to Yes and Jittering to 1.0. Right-click on Initial Speed and select Open Curve. In the Curve Editor window, enter the expression **6.5*sin(t*1.5)+1.5** into the text field. Change the values if you want a different wave in your animation: the formula is *WaveStrength * sin(t * PauseInterval) + 1.5*

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03 Check for the plug-in

Next, make sure that the Rea Flow plug in is active in Maya by checking for rea flow.mll under Window > Settings/Preferences > Plug-in Manager. If t isn't present, you need to download it via **portal.realflow.com**. If you don't own a copy of RealFlow5, you can get trials of the appl cat on and plug in via **realflow.com/rf_try.php**.

04 Export the geometry

Hide the Pier Group by selecting it and pressing [Ctrl]+[H]. Open the Rea Flow shelf, select the ground plane and click Setup SD Export Opt ons (second from the left) n the shelf to open the Export RealFlow SD dialog. In the Fie field, click the folder icon to open a browser. Browse to your Objects folder and name the file **ground.sd**, then click Export. Do likewise with the Pier, but name t **pier.sd**.

05 Set the correct scale in RealFlow

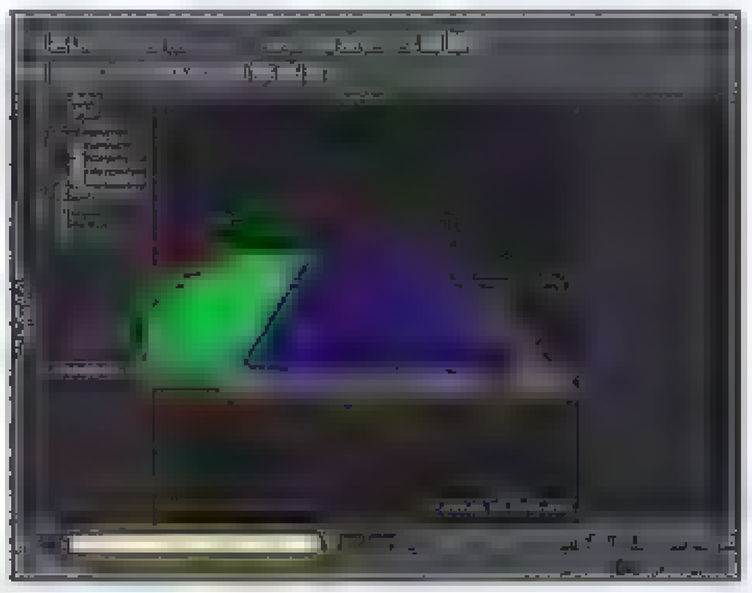
Before mporting the geometry into RealFlow, you need to change RealF ow's scale to match Maya's. If you mported the objects without doing so, they would be huge in Rea Flow, mak ng t mpossible to set up a s mulation. One grid un t in Rea Flow equates to one metre C ck the Scale Options buttons n the bottom toolbar and set Geometry Scale to 0.5 n the result ng dialog.

STAGE TWO

Creating the simulat on

Now that your geometry is in place, it's time to set up a Hybrido fluid container, create the emitters and daemons and do the base simulation. You'll set up one emitter on the far site of the pier, which will constantly emit new fluid inside your container. You need something to kill the fluid if it has travelled all the way down to the opposite site of the emitter: otherwise the fluid container would fill up like an aquarium. This versatile set-up with a constant flow in one direction is called a Channel You'll also learn a method for creating swells in Hybrido.



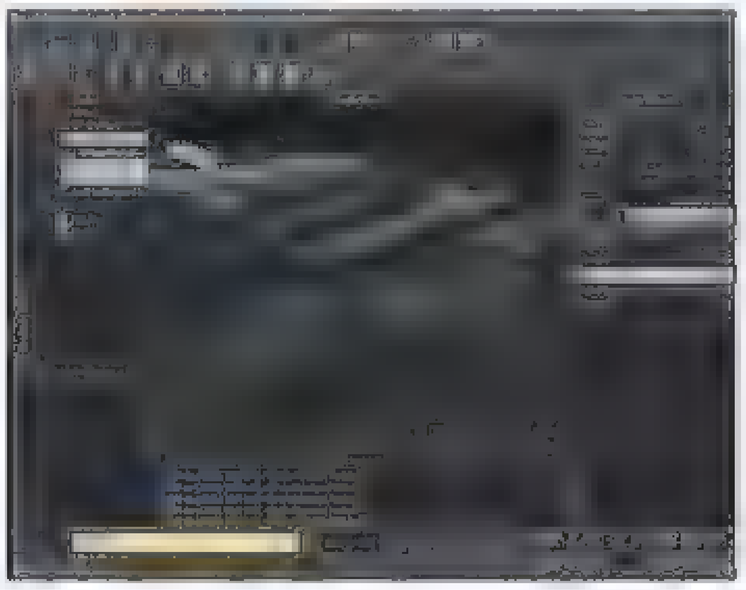


09 Create a Grid Solver

Select Ed t > Add > Grid Fluid > Domain. Th s creates a GridF dDomain01 node n the Nodes panel as well as a Grid Fluid container in the viewport. Make sure the GridFluidDoma n01 node is selected, and set it up according to the screenshot. If your simulation is running too slow, just delete one zero from Resolution

10 Create emission geometry

Grid Fluids need geometry objects that emit flu d: standard RealFlow particle emitters don't work with them. You need one emitter to create the waves and two emitters for the rest of the ocean. Create three cubes via Edit > Add > Object > Cube, then scale and position them according to the screenshot. In the Nodes panel, put them n a new group called **Emission Geometry**.







14 Set up the other emitters

The other em tters can be set up accord ng to the screenshot both can be set up the same. Now select each emitter and press [R] to get the rotate handle, and rotate each emitter unt l it s pointing horizontally towards the pier This is important: you want all your fluid to flow n the same direction in your Channe set-up.

15 Add k Volume Daemons

Select Ed t > Add > Daemon > k Volume. Move the field to a position behind the pier, right before the Grid Fluid's boundary In Node Params' k Volume sect on, set Inverse to Yes. Duplicate the k Volume by selecting t and pressing [Ctrl]+[D]. Posit on that field into the gap beh nd the wave em tter and the other Grid boundary

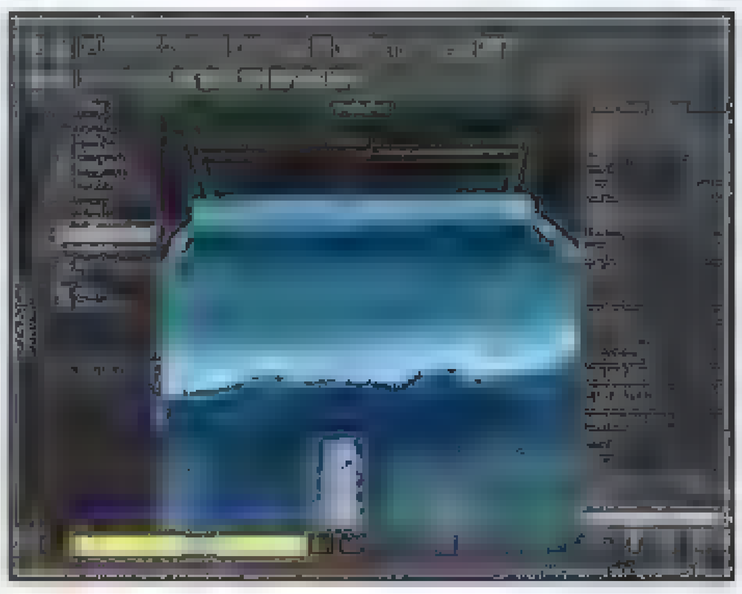
16 Add Gravity

Add a Gravity Daemon via Daemon Menu > Gravity. Group the k Volumes and the Gravity Daemon under the name **Daemons**. Drag this under the GridFluidDoma n01 node. In the field next to the Simulate button, enter a value of **500** (or 200 if you don't have much disk space). C ck Simulate Play with the values in the GridFluidEm tter_Wave expression and with Gravity unt l you are happy.

STAGE THREE

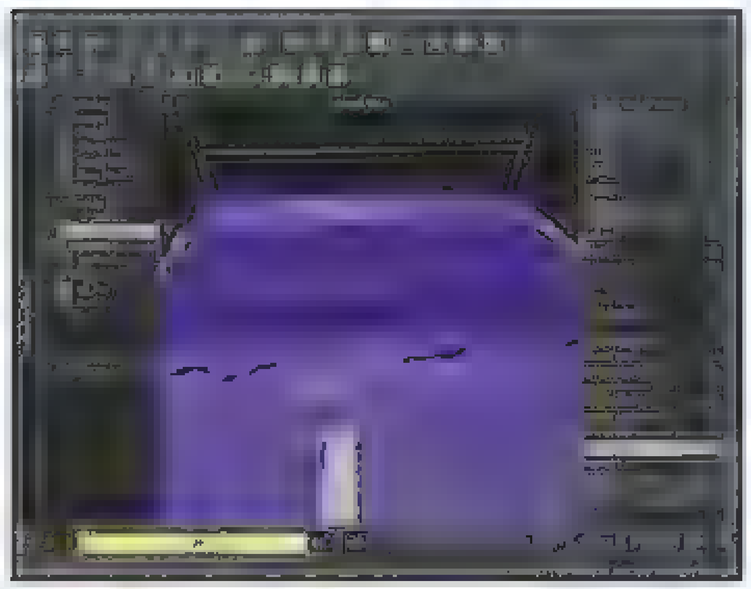
Refining the simulation

Next, you'll add detail to the water animation, starting out with displacement to create small choppy waves on top of the ocean surface. You'll also be adding so-called Splashes to form the white wave crests, as well as some mist for the finer droplets and foam on top of the water. Displacement, Splash, Mist and Foam are all parts of the Hybrido concept, so they all interact with one another. This means the order in which these elements are added to the simulation is important.



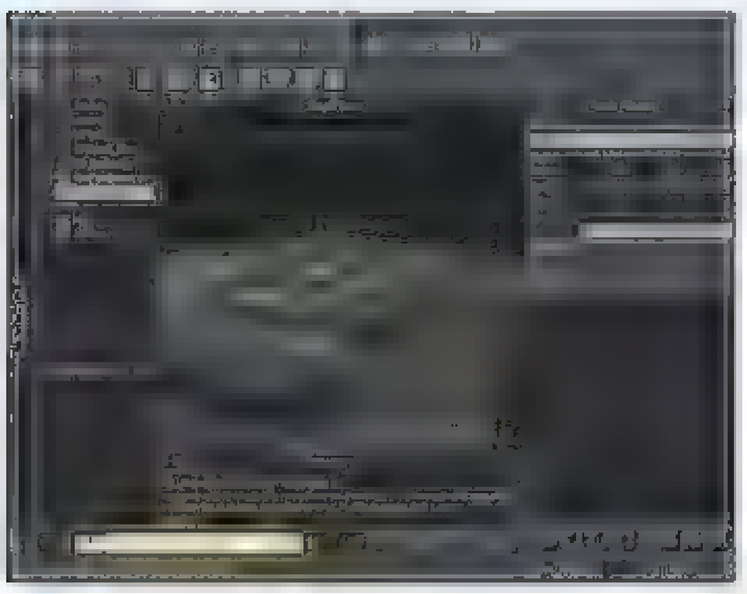
17 Add displacement

Select GridFluidDomain01 and open the Displacement Tab in the Node Params panel. Select a frame about in the middle of your animation. Enter the values according to the screenshot. Then open Display > Visible > No: this will accelerate your viewport. Select Edit > Add > Mesh > Grid Mesh to create a GridMesh node.



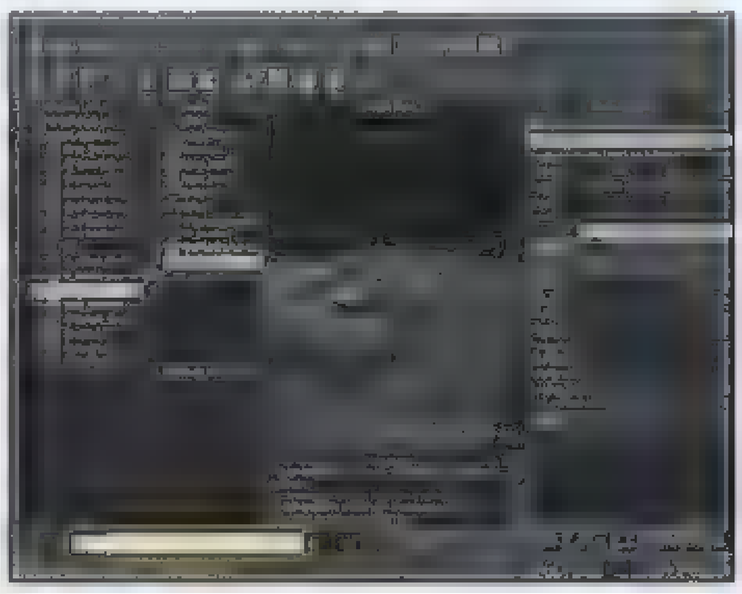
18 Set up displacement

In this node, select Shader > Displacement, then right-click on GridMesh01 in the Nodes Panel and choose Build for a preview of the surface displacement. Don't worry if the overall mesh isn't appearing: you just need it to preview displacement. Enable [F12] > GridDomains > GridFluidDomain01 > Displacement Texture. Delete the mesh node, make the Domain visible and re-simulate the whole scene



22 Configure the Mist node

Select GridFluidMist01 and set Mist > Bounded > Yes, then copy all the other parameters from the screenshot. Select Daemon Manager > Noise and set Strength to 2, then create another Noise Daemon, with Strength set to 1.5 and Scale to 2. Rename them to **Noise_Mist01** and **Noise_Mist02**, and link them with Gravity under GridFluidMist01 in the Exclusive Links. Simulate the Mist.



23 Add foam

Once it's done, select GridFluidMist01 > Simulation > Inactive. Now select Grid Fluid Menu > Foam to create a foam emitter. Group it under the GridFluid group, and connect it to GridFluidDomain01 in the Exclusive Links. Copy the values from the screenshot. Create a GridFluidFoam01 node in Exclusive Links and attach all the k Volumes to it. Do not attach any Gravity. Simulate until you are happy.

STAGE FOUR

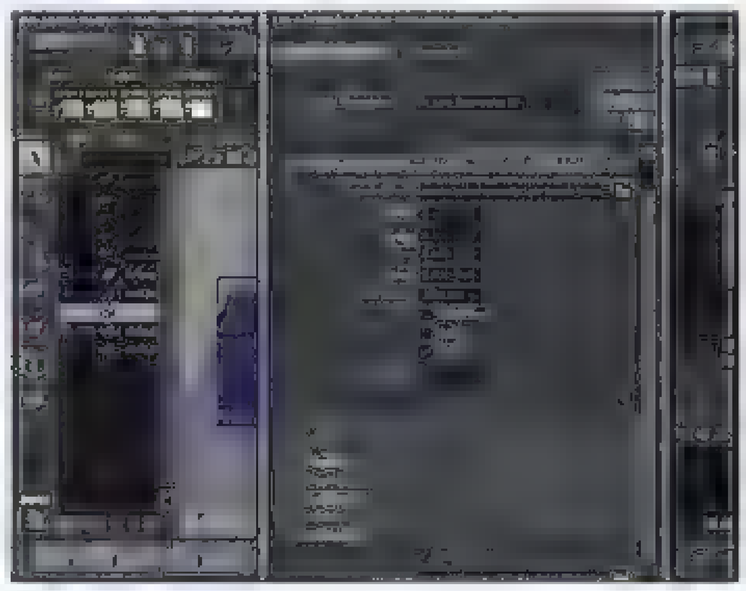
Animating in Maya

Now that the animation is done, you need to get all its elements (Main Fluid, Splashes, Mist, Foam) into a 3D package: that'll be Maya in this case, although the workflow is similar for other RealFlow-compatible packages. Since RealFlow Render Kit 2 provides a great set of tools for rendering RealFlow scenes, you'll use this to prepare the scene for rendering. You'll start by creating a Grid Mesh, then see how to treat the other elements.



27 Create an RFRK2 Mesh Node

Activate the RFRK shelf and click Mental Ray Mesher Object in the middle of that shelf. This will open a file browser window. Browse to your splash particle's location, select any file from that sequence and select Load. Now there is a rfrk2Mesh node created, and you can see a rfrk_geo_flowmesher node in the Attribute Editor. You might also see some particles in the viewport



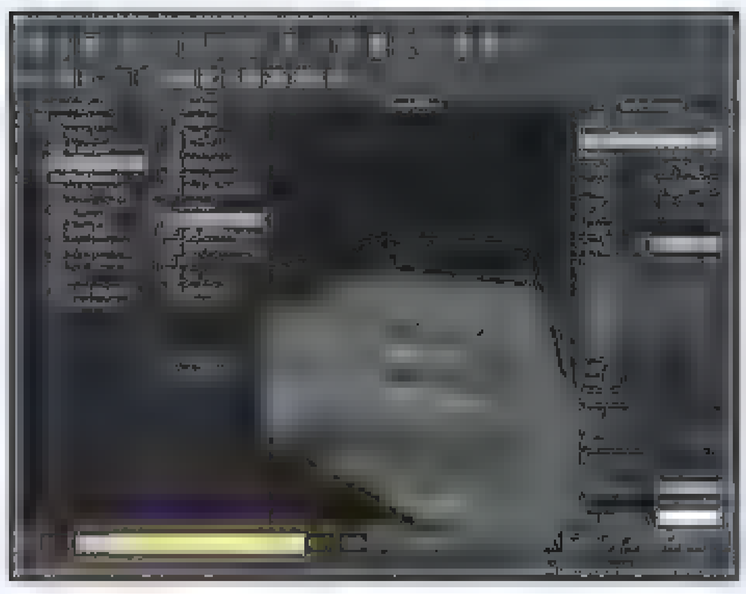
28 Import the Grid Mesh

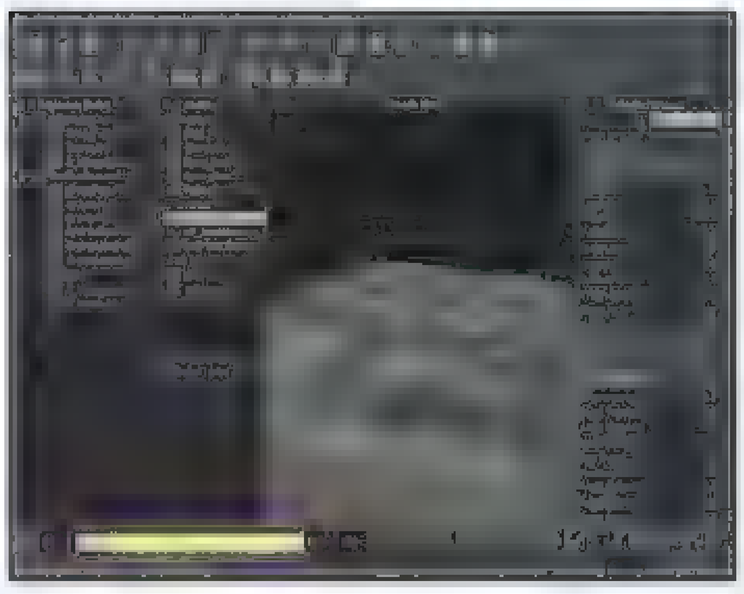
In the rfrk_geo_flowmesher node, select Sequence > Mute. This will hide the particles, as you will use this node primarily for creating a grid mesh. Scroll further down and go to BIN Mesh, then click on the folder icon. Browse to your Grid Mesh's location, select any of the BIN files and click Use. Tick Insert BIN Mesh. don't worry if you don't see any geometry in the viewport

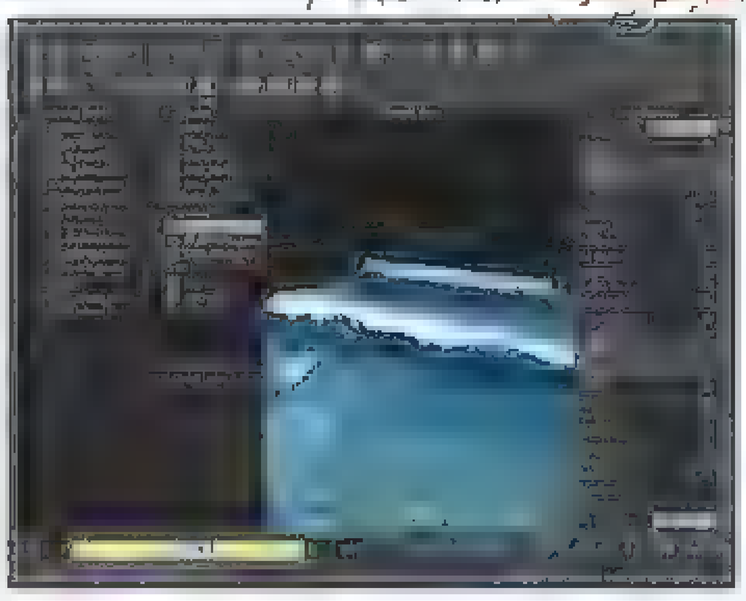


29 Import mist

For rendering Mist, you'll use RFRK2 Clouds, a volume rendering method. Click on the far right icon in the RFRK2 shelf and browse to the location of your Mist files. If you don't see any files there, you need to change the file type in the browser window from *.bin to *.mtc. Make sure to render Mist on a separate layer and combine it all together in compositing.







19 Cache and splash

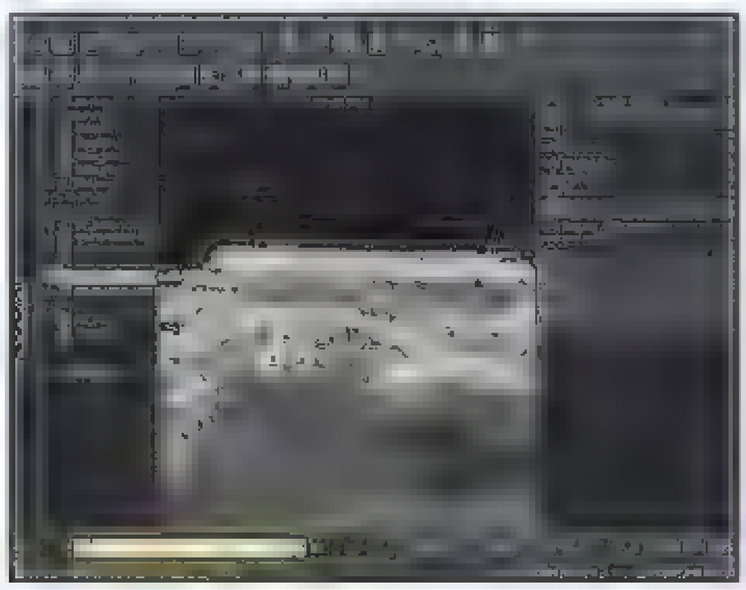
Once the simulation is finished, you don't need to recalculate the grid over and over again. Therefore, select GridFluidDomain01 > Node > Simulation > Cache. The node will now turn yellow, indicating that it's a cached node. Go to GridFluid menu > Splash and name the newly created node **GFSplash_Crest**. Scale it as in the screenshot.

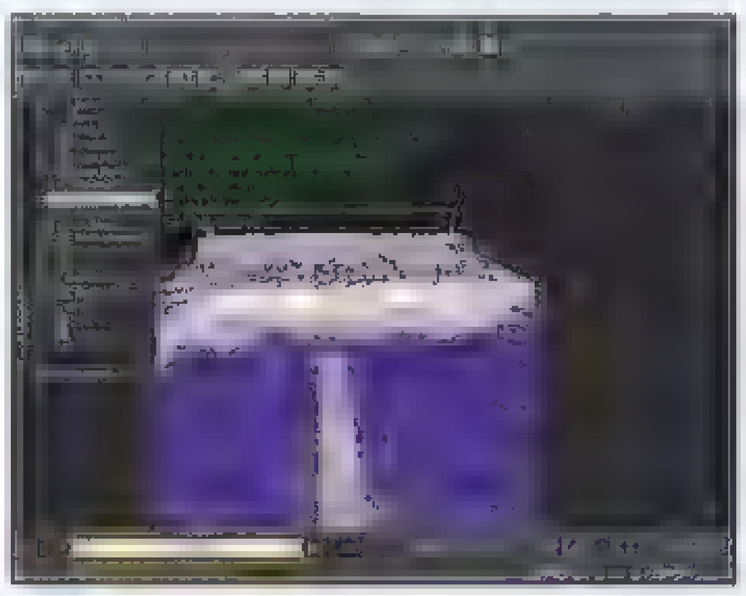
20 Set it up and simulate

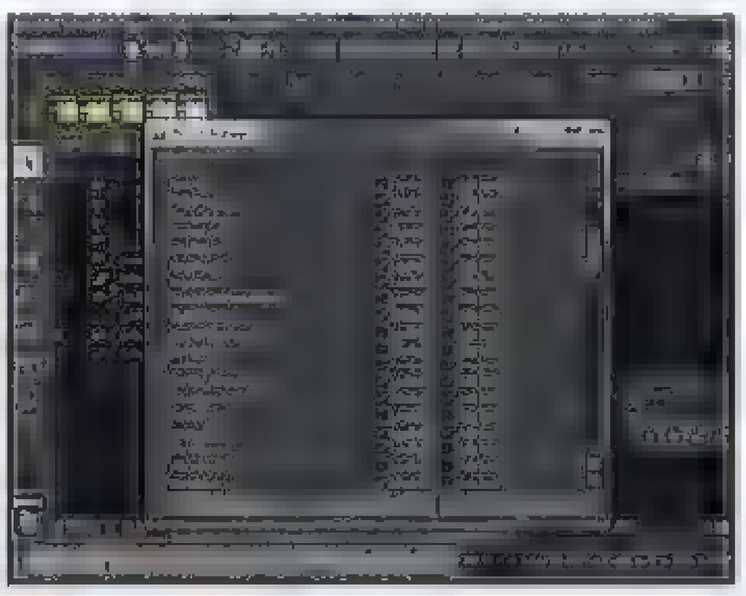
Enter the values from the screenshot into your Splash node. Drag the Splash under your GridFluid group in the Nodes Panel and connect it to GridFluidDomain01 in the Exclusive Links. Drag a new GFSplash_Crest into the Exclusive Links panel: link it with Gravity and a newly created K Volume, which must be scaled to the same size as the GridFluid Domain. Reset your scene, then simulate.

21 Add mist

Now that the Splash is simulated, set it into cache mode. Go to Grid Fluid Menu > Mist and put the Mist node into the GridFluid Group. Link it to GridFluidDomain01 in the Exclusive Links pane. Create a Main GridFluidMist01 node there and link the (cached) Splash node under the Mist node (not vice versa).







24 Set up the Grid Mesh

Create a GridMesh node as you did in step 17 and copy the parameters from the screenshot. Select Shader > Shader Type > Displacement to see the displacement with the new mesh. To make the displacement move with the mesh, select Texture > UVW Mapping > Top projection (Average Velocity).

25 Build the mesh

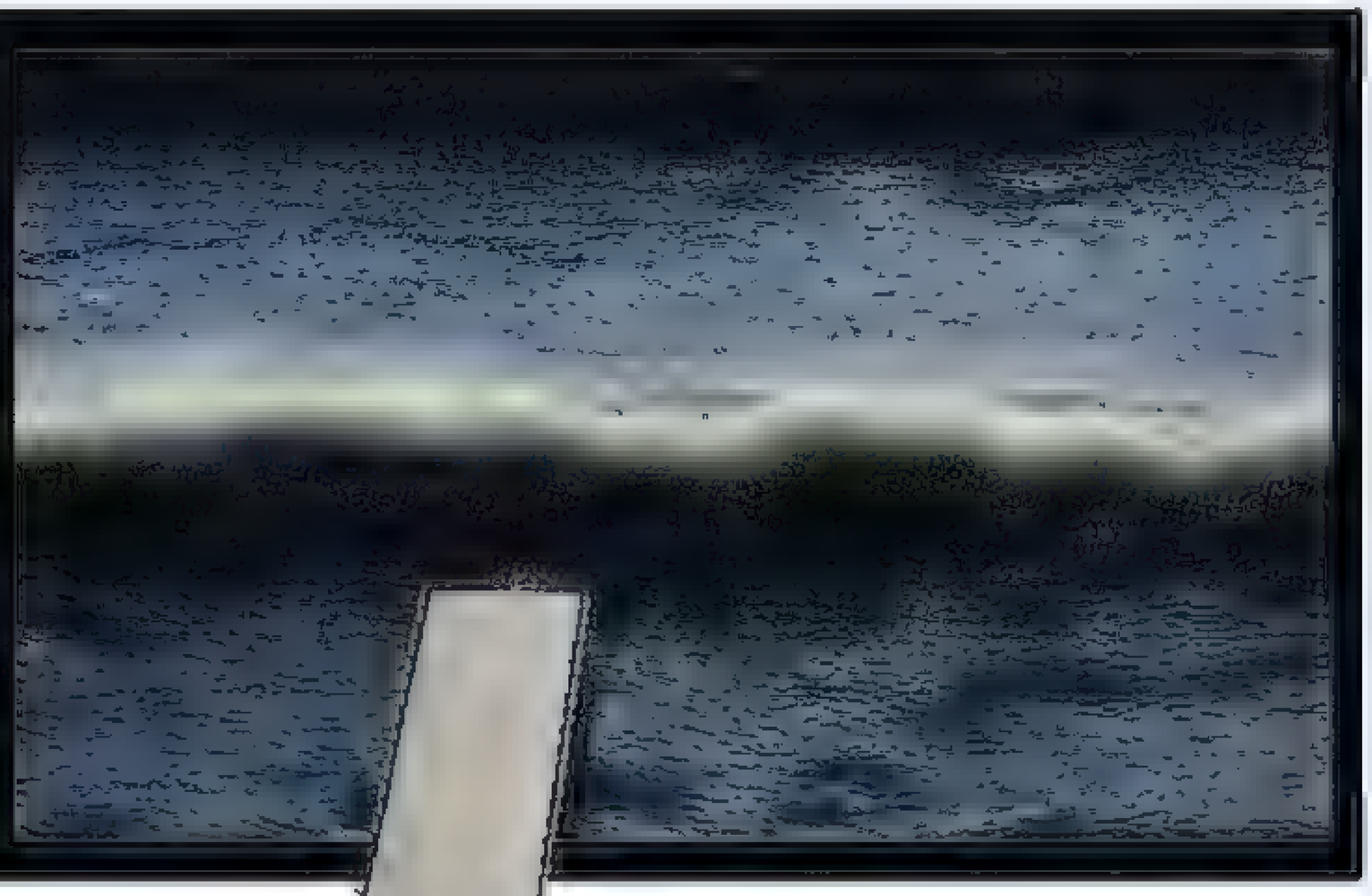
Select GFSplash_Crest > Simulation > Inactive, then do the same for Mist and Foam: you don't need those for meshing. Step to frame 0 in the timeline, then save your project. In the Scripts Bar, click the Build Meshes button on the far right to initiate the meshing for the whole sequence.

26 Check for RFRK2 in Maya

As you'll be preparing the scene for rendering using RealFlow Render Kit 2, you need to make sure it's loaded. In Maya, open the scene containing the pier and sea ground. Open Window > Settings/ Preferences Plug-in Manager and make sure that realflow_renderkit.mll is loaded. If there is no such entry, you need to download and install RFRK2 via **realflow.com/rf_try.php**.

30 Final steps

Now import Foam and Splash, using separate rfrk2Mesh nodes. You can add the displacement texture by creating a RFRK2 Displacement Node in Hypershade and piping that into the Mental Ray > Custom Shader's > Displacement Shader field of the grid material's shading group. Set Repeat UV in the place2dTexture node, like you did in the Grid Fluid Displacement in RealFlow, but with a negative V value. Create a new RFRK Splash and import the Splashes again; set Radius to 0.5 and Density to 1.0. Generally, if you cannot see anything when rendering a rfrk_cloud, increase Radius Scale to 0.5 or more. Import Foam using a new RFRK 2 mesher; set Radius to 0.08, Polygon Size to 0.025 and Core to 0.009. Use mental ray for rendering: RFRK2 for mental ray won't output anything if you use another renderer. Now you can start shading and lighting until you get your desired result.



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Using 3D-Coat, you can model and texture this weapon, then export it in a games-friendly format and resolution

Create a low-poly game weapon

Model and paint a weapon for a gaming level or animation as **Phil Nolan** explores the tools and workflow of the sculpting package 3D-Coat

Pilgway's 3D-Coat is a capable piece of software in which you can create amazing assets for games, film or other types of media. It's constantly evolving, with new tools added frequently. This tutorial will get you started with the basics of creating a game model from scratch: you'll build it as a voxel sculpture, retopologise it, set up the UV map, paint textures, and finally export it to your favourite animation program or game engine. The videos that accompany this tutorial highlight key areas of the process to help you develop an efficient workflow in this powerful program.

Thanks to Jan Cavan (dawghousedesignstudio.com) and Pilgway (3d-coat.com) for providing sample brushes for use with this tutorial.



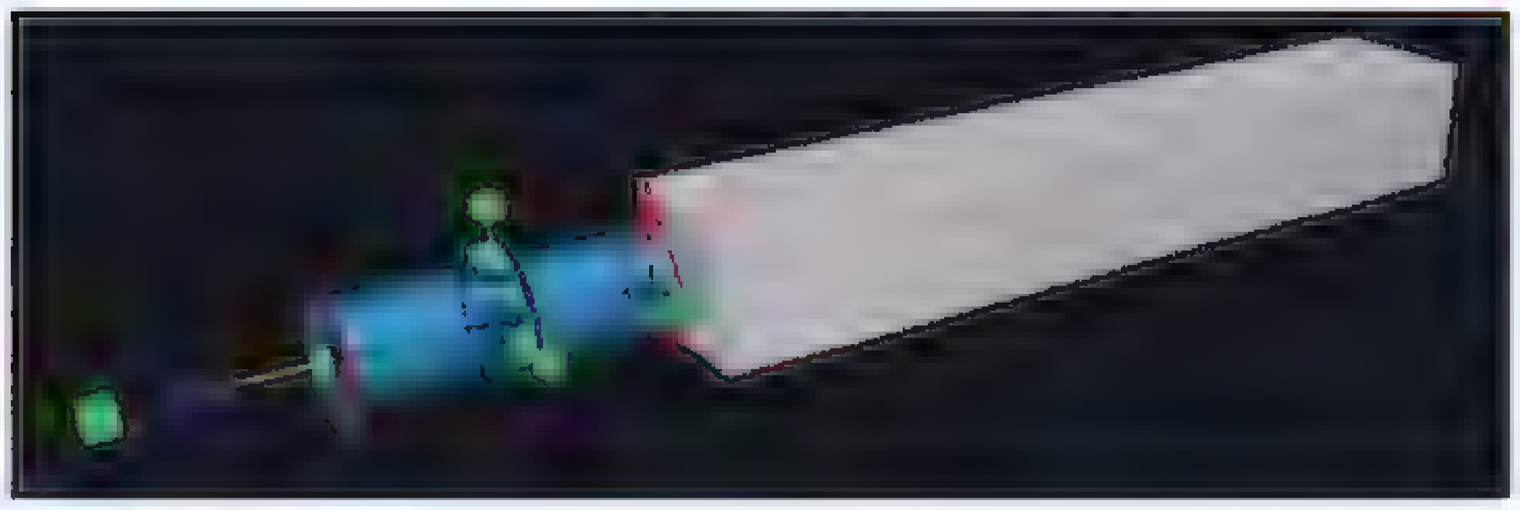
About the author
[illegible]



STAGE ONE

Voxel sculpting

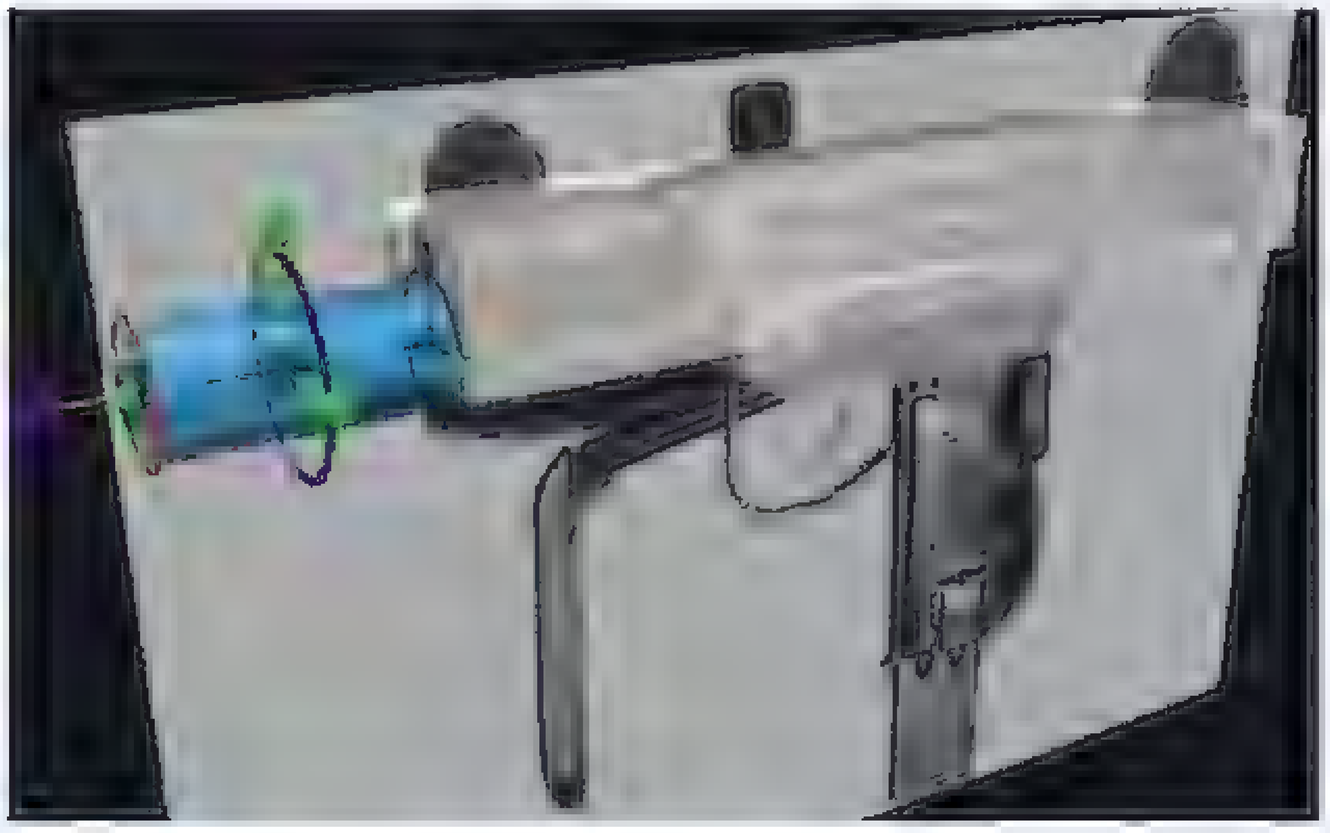
Whether you're making an alien warrior or a simple prop, when you start from scratch in 3D-Coat you will be in the Voxel room. When you work with voxels, you are not manipulating the polygonal mesh that you see: you are really turning on and off an invisible 3D grid of voxels that fill the entire world space. The voxels that are turned 'on' will be surrounded by a triangle mesh. This means that you can punch holes directly through the sculpture, smooth thin areas away until they disappear, and perform Boolean operations like adding one object to another or using one to cut holes in another.



01 Voxel primitives

A voxel model can be made in several ways, from painting in mid-air to importing objects from another program. This project, however, starts as a base model made from objects found in 3D-Coat's Primitives palette. Click Objects > Primitives in the left sidebar and you will see the primitives you can use listed in the Tool Options panel. Press [Enter] to convert a primitive to voxels. When you need more detail, you can increase voxel resolution with the grid icon at the bottom of the Vox Tree tab.



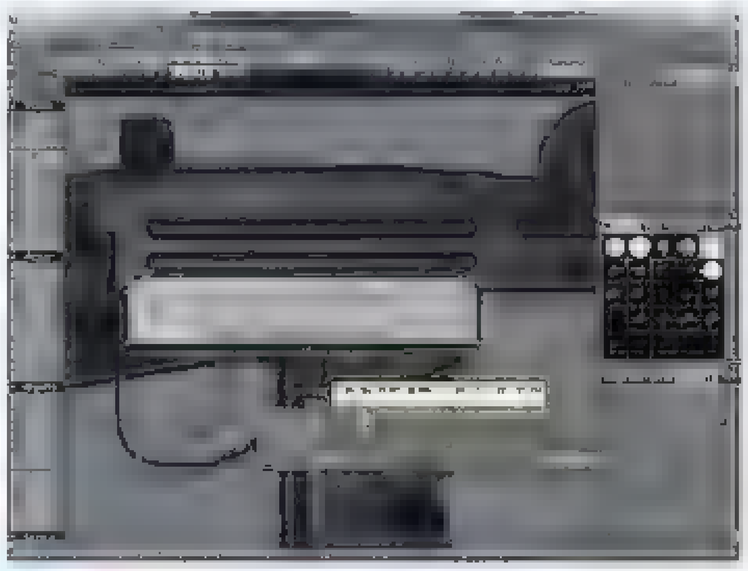


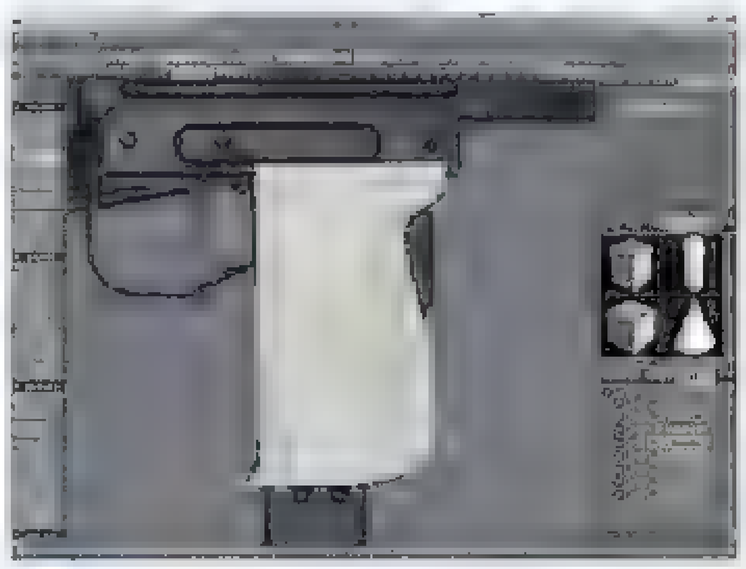
02 Primitive scale

When importing a model or using a primitive, the scale of the model determines the initial resolution. Start off small and work your way up from there. This way, the model will have the lowest possible poly count while keeping the detail you want. If you press [Enter] and find that your voxel mesh is not detailed enough, you can always undo and scale the primitive shape up some more, then press [Enter] again.

03 Placing and cutting primitives

Start placing primitive objects in position. If you want to keep them separate from each other, place them on separate layers in the Vox Tree. By holding [Ctrl], you can use primitives to cut shapes out of existing meshes. It helps to load a background image to help with placement under the menu Camera > Background > Choose Ref Image for X Axis. A reference image is included with the scene files for this tutorial.







04 Quick-access brush options

The Brush Operations panel may well become your best friend in 3D-Coat. It's accessed via the icon at the top of the left sidebar or simply by pressing [E]. The left-hand tools control stylus pressure, while the tools on the right can be used to draw shapes. When combined with [Ctrl] and the Carve tool, you can cut shapes out of existing objects. [Ctrl]+[Shift] will cut away everything outside the selection.

05 Shaping the handle

You can make the basic handle of the gun with a stretched-out Cube primitive. Then using the Brush Operations tools and the Carve tool with [Ctrl]+[Shift] held down, you can cut away from it to shape the handle. Smoothing the shape out can be done with the Smooth tool or with any of the other tools while holding [Shift]. Reducing the resolution can help a lot with smoothing.

06 Multi-res modelling

3D-Coat's multi-res system works a little differently to other polygonal sculpting programs. You can always reduce the resolution, no matter what res you started at. Click the Downgrade icon (the hard drive) on a Vox Tree layer to reduce it; click again to return to high-res. You can adjust the effect via Voxels > Proxy Visualization. This also switches you to Surface Mode which is like poly sculpting; click the Restore icon in the same layer to get back to voxels.

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07 Merging objects

If you need to make a shape that isn't included in 3D-Coat, you can import objects from another 3D program with the Merge tool. Click Select Mesh in Merge's Tool Options to choose the object. The shape must be 'water-tight' with no holes in it. After importing the object, scaling it sets the resolution that the voxel mesh will adopt, which you can see in Tool Options. Press [Enter] to make the voxel mesh.



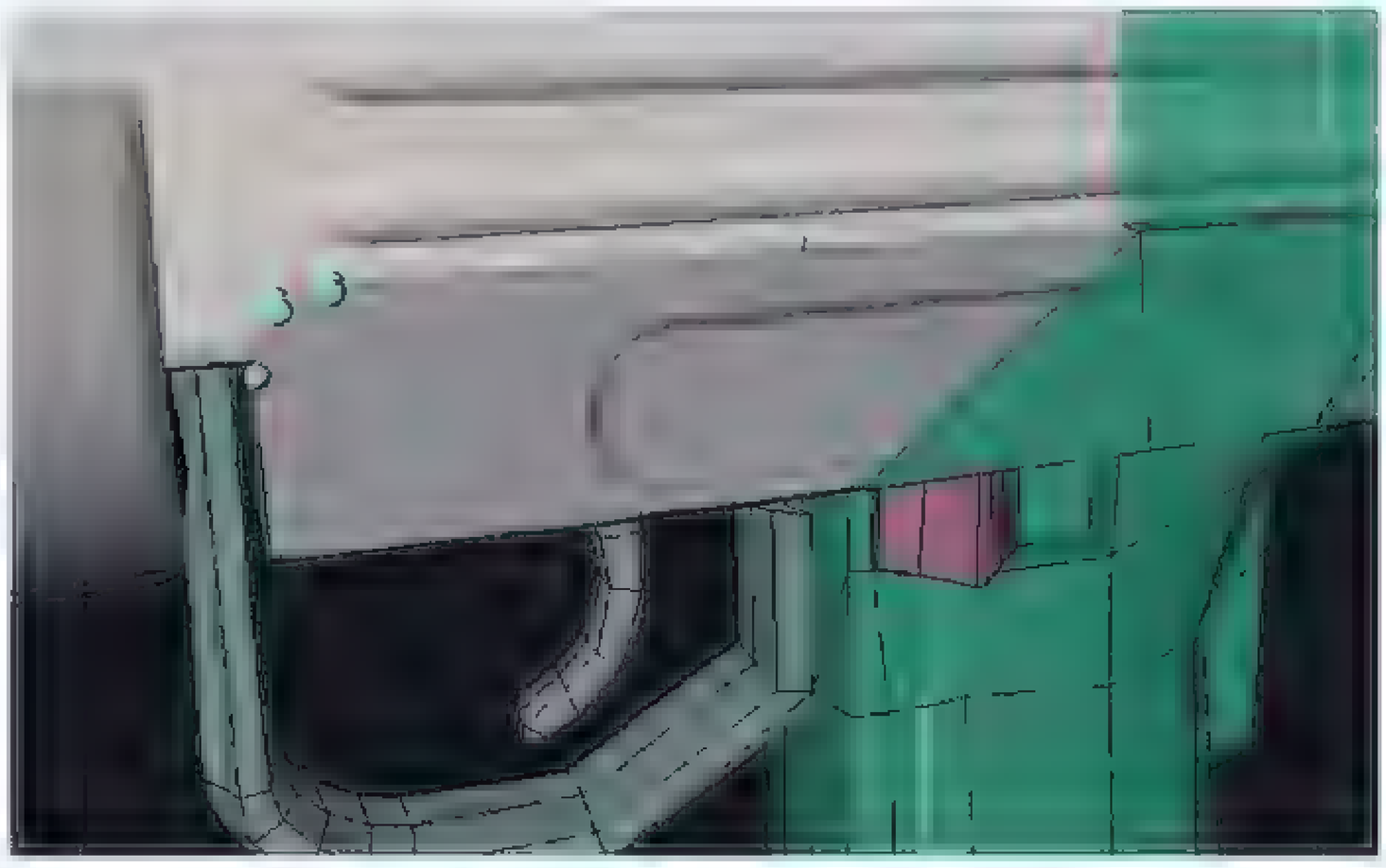
06 Curves

You can use the Curves tool to make the capsule-shaped ridges on the sides of the gun. Click to place each node and click the node again to enable a gizmo to adjust it [Esc] removes the gizmo or clears the curve. See Tool Options for more adjustment choices. Choose the hemisphere profile for rounded ends. When you have it the way you like it, press [Enter] to create the voxels. Remember to keep components on separate layers.

STAGE TWO

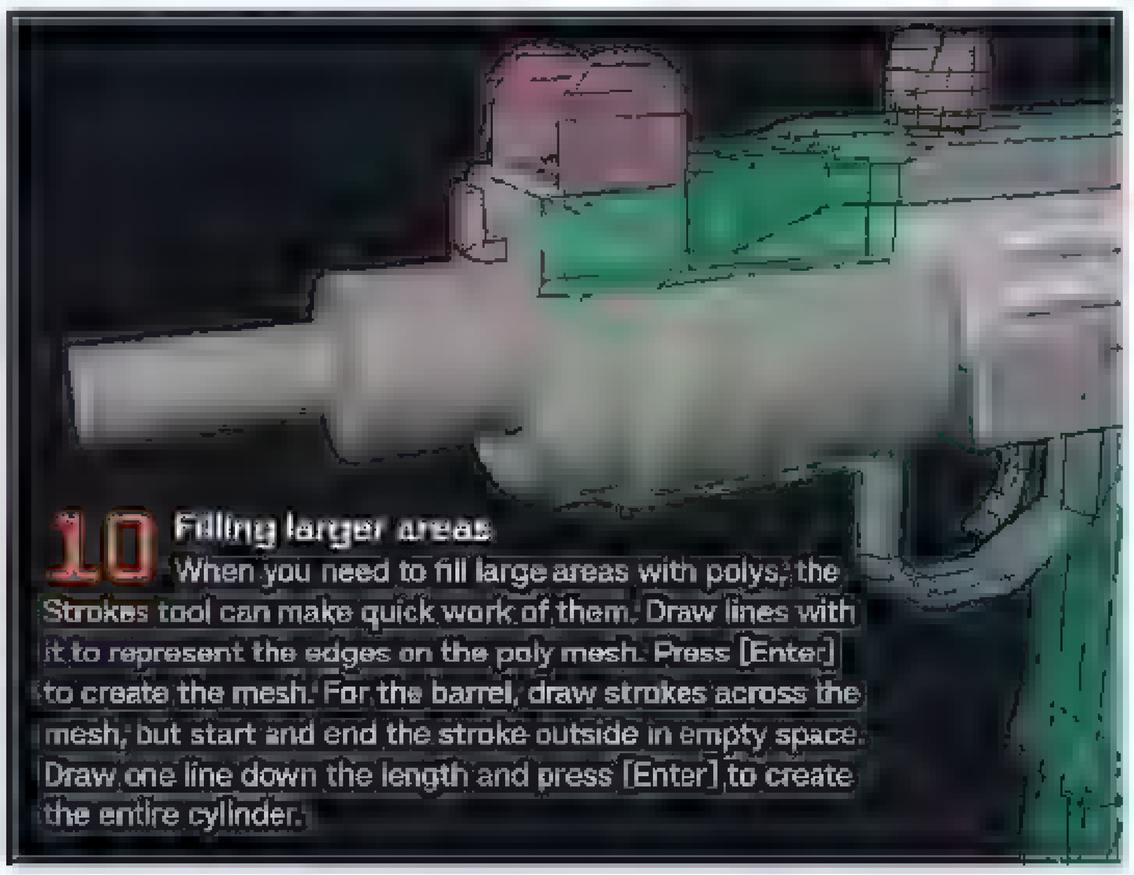
Retopology and UVs

3D-Coat is well-known for its simple yet powerful retopology tools. When you're finished with your voxel sculpting, you can jump right over to the Retopo room. All of your tools are available on the left or by pressing [Space]. The Create section has tools that enable you to quickly add polygons that automatically stick to the surface of the model.



09 Placing polys

For a hard-surfaced model like this one, my tools of choice are mostly Quads and Points / Faces. The latter enables you to place points precisely where you'd like them with the left mouse button. With the right button, you can then create polygons between the points you've placed. The Quads tool will let you select an edge and constantly pull new polygons away from it until you press [Esc] to drop the selection.



10 Filling larger areas

When you need to fill large areas with polys, the Strokes tool can make quick work of them. Draw lines with it to represent the edges on the poly mesh. Press [Enter] to create the mesh. For the barrel, draw strokes across the mesh, but start and end the stroke outside in empty space. Draw one line down the length and press [Enter] to create the entire cylinder.



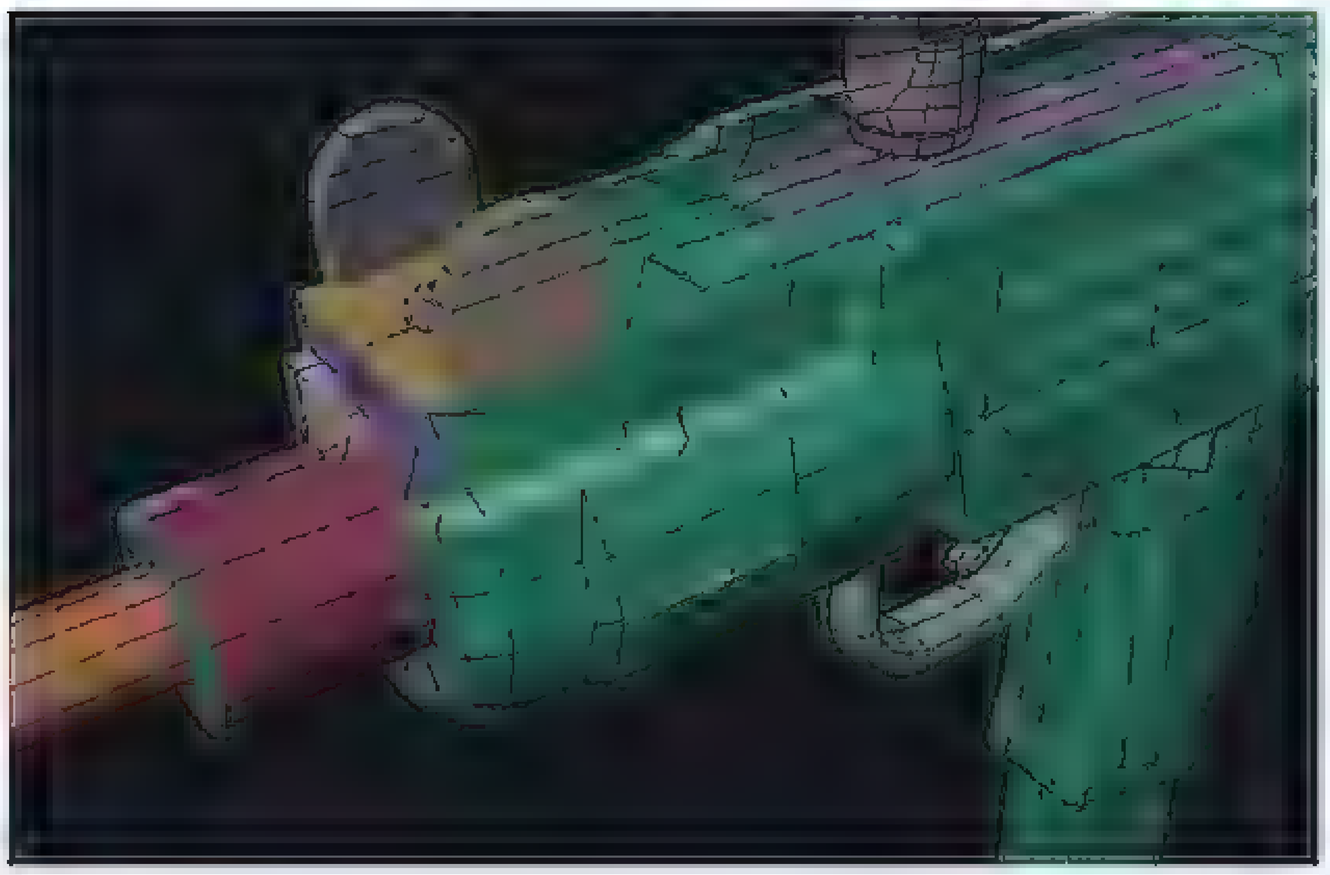
11 Symmetry and groups

Along with the other rooms, the Retopo room can use symmetry to mirror your mesh as you work. However, it's only temporary. To make it permanent, select Retopo > Apply Symmetry (either for all layer or for the current layer). Groups are like layers that can be turned on and off to hide parts of the mesh while you work. Groups will also become separate objects when you move to the Paint room.

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12 Adjusting the mesh

As you work, you may find that you need to make changes to polys you've already laid down. The Tweak section has tools for creating edge loops and moving the mesh. The Move Vertices tool can also be used to weld points together by simply dragging one onto another. The Brush tool in the Create section can also move points around, but by holding [Shift] it can smooth out a messy mesh. Try holding [Ctrl] with these tools as well.

13 Marking UV seams

When you're finished with retopology, pick the Mark Seams tool and start selecting edges that will separate the UV islands. This can be made easier by holding [Shift], which makes the tool select an entire edge loop up to the next seam it hits. Holding [Ctrl] will unmark the edges and [Shift]+[Ctrl] will unmark entire loops.

14 Unwrapping

When you've finished marking seams, click the Unwrap tool and 3D-Coat will lay out your polys flat in UV space. Check it out in the UV Preview panel, and make sure that everything looks right. You can go back to adjust your seams further, then click Unwrap again.



15 Adjusting the UV map

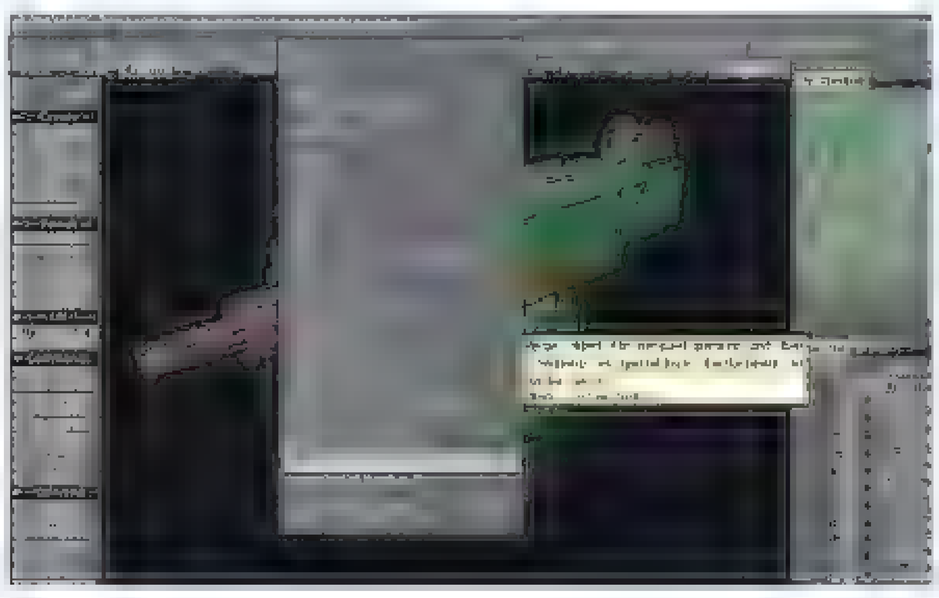
Along the top of the screen you will see several selection types. With Islands selected, you can click one or more islands in the preview and use a gizmo to control the scale, rotation and position in UV space. [Ctrl]-click deselects. The Brush option along the top works similarly to the Retopo Brush tool: while holding [Shift], it will smooth any distortions in the UV mesh, as indicated by red and blue colouring.



STAGE THREE

Start painting

In the Paint room, you'll handle painting all of the textures and finer details that you didn't sculpt in the Voxel room. This is the oldest part of 3D-Coat, so you'll find a lot of well refined tool, including real-time normal map painting, cavity painting, and other tools that you'll recognise from programs like Photoshop.





16 Merging to the Paint room

When you're satisfied with your UV map, look in the Retopo menu to find several Merge options. For a game model like this, your best bet is Merge With NM (Per Pixel). This will bake all of your finer details to a normal map in Per Pixel mode, which will not deform your mesh as you work, like micro-vertex mode will.

17 Options

The first dialog you see will ask about occlusion; this can take a little extra time, but really helps your model to pop. The default setting should be fine. In the next dialog, pick Auto Smoothing Groups, an angle in the upper 60s should be good. Next, select how big your textures will be. My Uzi model uses a 2,048 x 2,048 size.

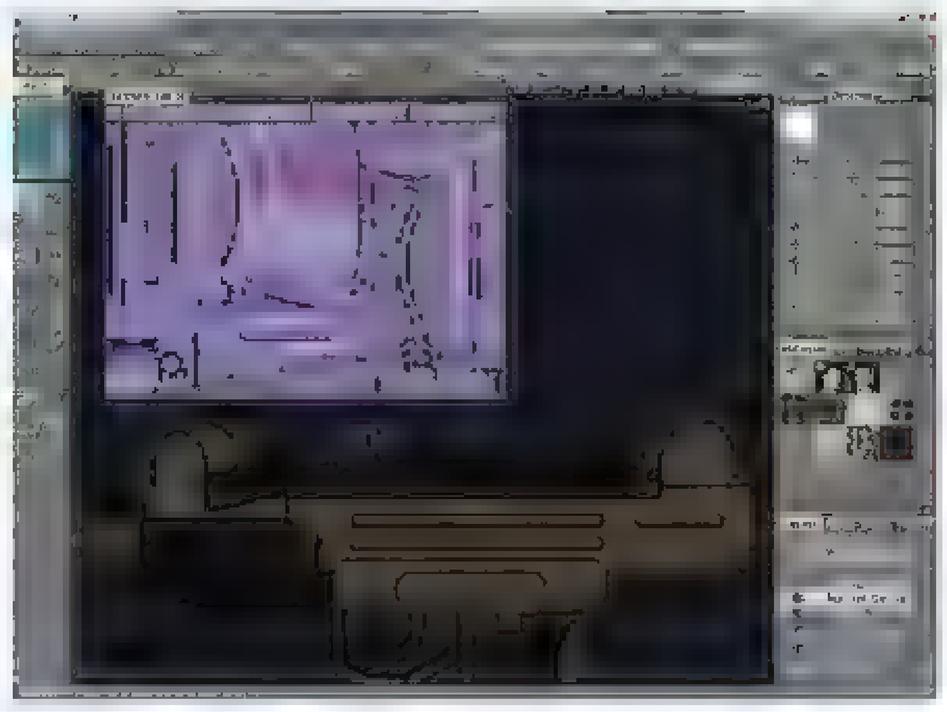
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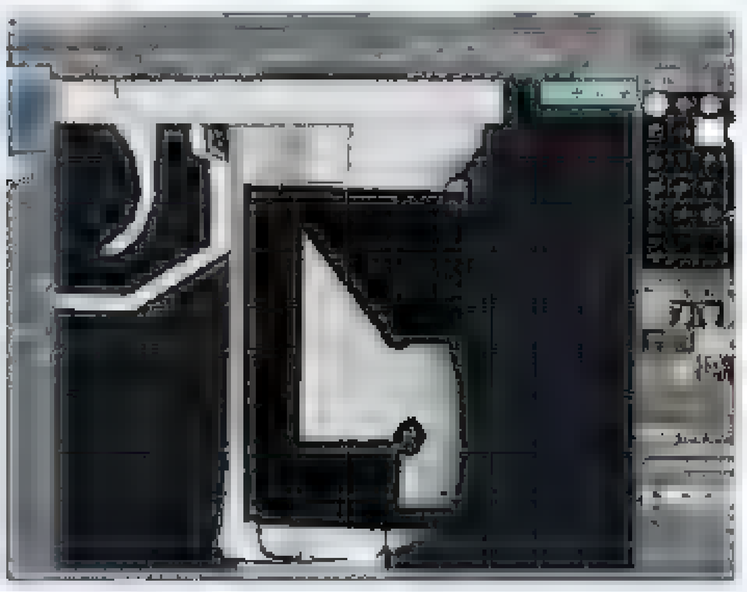
18 Lay out base colours

In the Layers panel, you'll find layers for the normal map, occlusion, and for each voxel layer you created. These voxel layers can be deleted with the trash can icon. Disable the purple Depth icon at the top of the screen; this way you will only paint colour and specularity. Paint some solid base colours, each on their own layer. Via Textures > Texture UV Editor, you can paint in 2D as well.



19 Normal details

Make a new layer, and set only the Depth sphere along the top of the screen active. Here you can paint any finer details that you didn't get in the Voxel room, like small screws and text. This tutorial's project files include Oliver Thornton's Brushes Pack, with brushes like screws that will help out with the details here



20 Grips

Using the Draw With Splines tool with the Freeze option and also the Freeze tool itself, you can mask off areas you don't want to paint. Mask off some areas and enable View > Grid 2D Mode With Snap to Grid on, you can use this mode to draw straight lines with only the Depth channel enabled. It helps to select View > Relief Only instead of the normal Low Smooth Shade.



21 Scratches and scuffs

Pick a light grey color and enable all three spheres up top. In the Masks panel, you can load an alpha image or Photoshop brush as a mask by clicking Add (the + icon). A set of scratch brushes are included in the project files. With a mask loaded, hold [Ctrl] and brush over the model to paint scratches with colour, depth and specularity.



22 Dirty cavities

Pick a black colour and a paint spatter type of brush. (I load the default brushes from Photoshop.) In the Options panel, you'll find settings to add some jitter and spacing. In the menu bar is a drop-down menu saying Pressure Not Dependant on Color. At the bottom of this list, pick More In Cavity and paint some dirt. Do the same in white.



23 More dirt

Disable the Cavity painting option, and paint some more black and white dirt around the gun. Keep in mind the places where dirt is likely to build up, such as around the grip, where the hand would touch it, and between the sights.

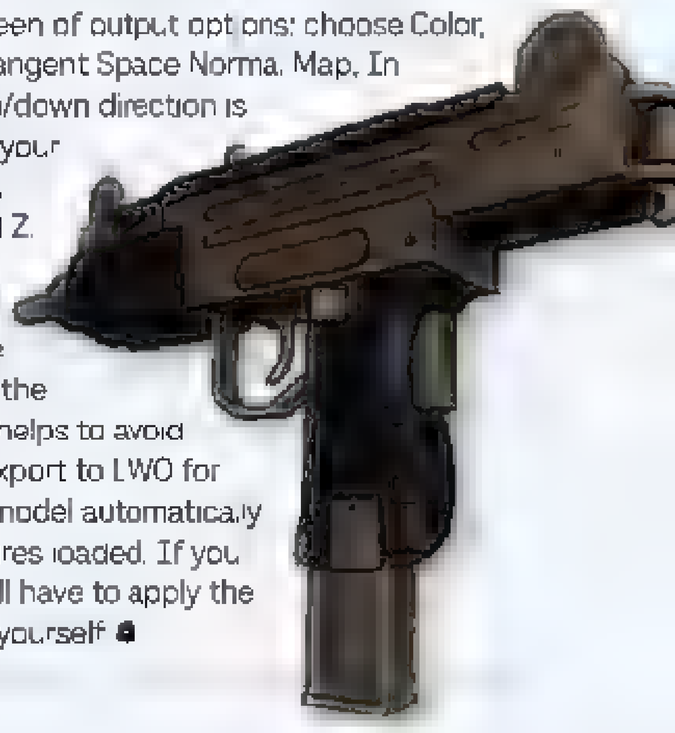


24 Shadows

On a new layer, paint some black inside the muzzle, deep screw holes and eject on port. Use the pressure sensitivity options in the Brush Operations panel to soften the shadow edges. Try using the Paint Bucket tool in Lines mode to add a gradient.

25 Export

When you've finished your model, select File > Export > Export Model (OBJ, LWO). First you're asked to choose the file name and where to save it to. Next is a screen of output options: choose Color, Specular, and Tangent Space Normal Map. In 3D-Coat, the up/down direction is on the Y axis: if your program uses Z, tick Swap Y and Z. Also tick Create Padding, this expands texture colours beyond the UV map, which helps to avoid seams. If you export to LWO for LightWave the model automatically has all the textures loaded. If you use OBJ, you will have to apply the texture images yourself.





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ZBrush Texturing

FOR
ZBrush 4

TIME TAKEN
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TOPICS COVERED
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3dworldmag.com/143

Scott Spencer's skin detailing of his own bust design uses airbrush-derived techniques



About the author

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109 minutes of video at 3dworldmag.com/143

Paint a demonic creature in ZBrush

Create a richly layered skin texture and more as Scott Spencer shows you how to apply Hollywood model-making techniques to digital sculptures

The artist-friendly workflow of ZBrush makes it easy for many real-world techniques to be adapted for use for the software. The particular painting technique I demonstrate in this tutorial forms the backbone of my own approach to texture painting and creating skin textures for concept designs in my day-to-day work. This approach is a fast and efficient painting method, which can be used on its own or to accentuate a texture built up from photo projections. I hope it will encourage you to explore other media, looking for processes that can be used in a digital workflow.

The model I paint is a demon bust; you can discover how I sculpted it in the previous issue of 3D World, although it isn't essential for following this workshop. I'll explore a method of painting a creature skin texture, using a technique based on widespread airbrush painting methods. With the help of some basic colour theory, you can build up a layered paint scheme that mimics the look of translucent creature skin. Throughout the painting process, I use ZBrush 4's layers system, an improved and fully production-tested method for breaking sculpting and painting passes into their own fully editable layers.

I'll also look at how to project photo reference in ZBrush using the ZApplink plug-in. I'll texture the demon horns using images taken from an actual animal horn. To complete the project, I'll show you how to take this final polypainted skin and bake it into a usable texture map that can be exported to render in other applications.

WATCH THE VIDEO TUTORIAL

Follow Scott Spencer's complete workflow for this project and pick up more great techniques with the video on the 3D World website

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Video 1 [redacted]
The initial layer is a simple light beige. You can substantially alter the final look of the texture by changing this base layer: see what happens if you make it green, for example

Video 2 [redacted]
There's no need to be subtle when you create the temperature layer. Add reds where blood is close to the skin surface and blue in recessed areas







Stage 1

Blocking in the base layers

In this section, we'll look at how to lay in the colour texture of the character. You'll make extensive use of the layer system, an area Pixologic has greatly expanded and improved in ZBrush 4. Not only are layers more robust and stable, but they also now support polypainting, which was not an option until this newest version of ZBrush. This means you can separate key elements of the paint scheme into their own layers for a higher degree of freedom and flexibility when working with colour textures. Because of this layer functionality, you can separate the detail passes from the underpainting passes. This lets you experiment with various hues as the base for your paint scheme. You can affect huge changes on the overall look of the colour pass just by changing the underlying colour.

The painting technique shown here is based on the process used by many artists to paint foam latex or silicone prosthetics and props. By careful consideration of some basic colour theory and adjusting airbrush techniques to ZBrush, you can quickly paint an interesting and realistic skin texture. We'll look at how to customise brushes to spray colour in a more chaotic pattern and how to model using contour shading. In summary, this section should introduce you to a new and exciting way of painting, which offers many options for creating creature skins without having to rely solely on photo projections.

You can either paint on my demon bust, provided as the ZTool demon_045.ztl in this tutorial's scene files, or apply the techniques here to your own character or creature. You'll create four essential layers in this stage.

Video 1 00:05
The underpainting layer

You'll begin this workshop by creating the initial layer and filling it with your chosen base colour. Make sure you are at the highest subdivision level and open Tool > Layers: you'll use this menu to break apart the various colour passes to maximise the flexibility of the paint approach.

With a new layer created, select a light beige colour via Color > SysPalette. For my demon, I chose R 221, G 197, B 145. Use the Standard brush with just RGB enabled to paint this colour over the entire head. This light beige will serve as your base colour. You'll add new layers over this, where you'll place your subsequent painting. If you want to experiment with other base colours, create a new layer and choose another base hue. (In the video, you'll see me create a second base colour layer of green.)

The base will be visible in only a few places in the final paint scheme, but it affects how you put colour down on the model: this hue impacts how you see all the colours you put down on top.

It's important to note that the layer hierarchy in ZBrush is inverted from what you might be used to from Photoshop (or indeed, most other apps that use layers). The layers on the bottom of the list display as the top layers on the model, rather than the more familiar top-down system. Keep this in mind as you work with multiple layers later.

Video 2 00:05
The temperature layer

You'll use a custom brush for the majority of this paint process. I call it a spatter brush because it spatters paint in a broken-up irregular pattern over the surface of the model. The brush is inspired by airbrush painting techniques, where layers of colour are often built up with the airbrush set to a low air pressure, causing the paint to come out in spotty patterns instead of a single even mist. Irregularity is so common in nature that building up colour in this manner helps you avoid an unnatural perfect spray-painted look.

To create the custom brush, select the Standard brush and change Stroke to Spray. Under the Stroke options, turn Color all the way down so that ZBrush doesn't try to alter the hue as the brush is used. In the Alpha palette, select Alpha 07 to further break up the colour as it's applied.

You'll first use this brush to paint a vibrant temperature map of the face. Colour temperature describes the relative warmness or coldness of a colour. The point of this step is to lay in vibrant colours, ranging from warm reds to cool blues, all over the head. Don't be shy about making these bright: they will eventually be under more layers of colour, so the brighter they are, the more effectively they will show through the final paint job. This layer should look something like clown make-up.

Lay in warm colours over the cheeks, lips, ears and neck. Cool colours should go in the mouth area and around the beard line, as well as into the recesses like the eye sockets. Use yellow on the face but concentrate it over the bone structure. These dots of colour will mix together where they overlap, creating secondary colours.

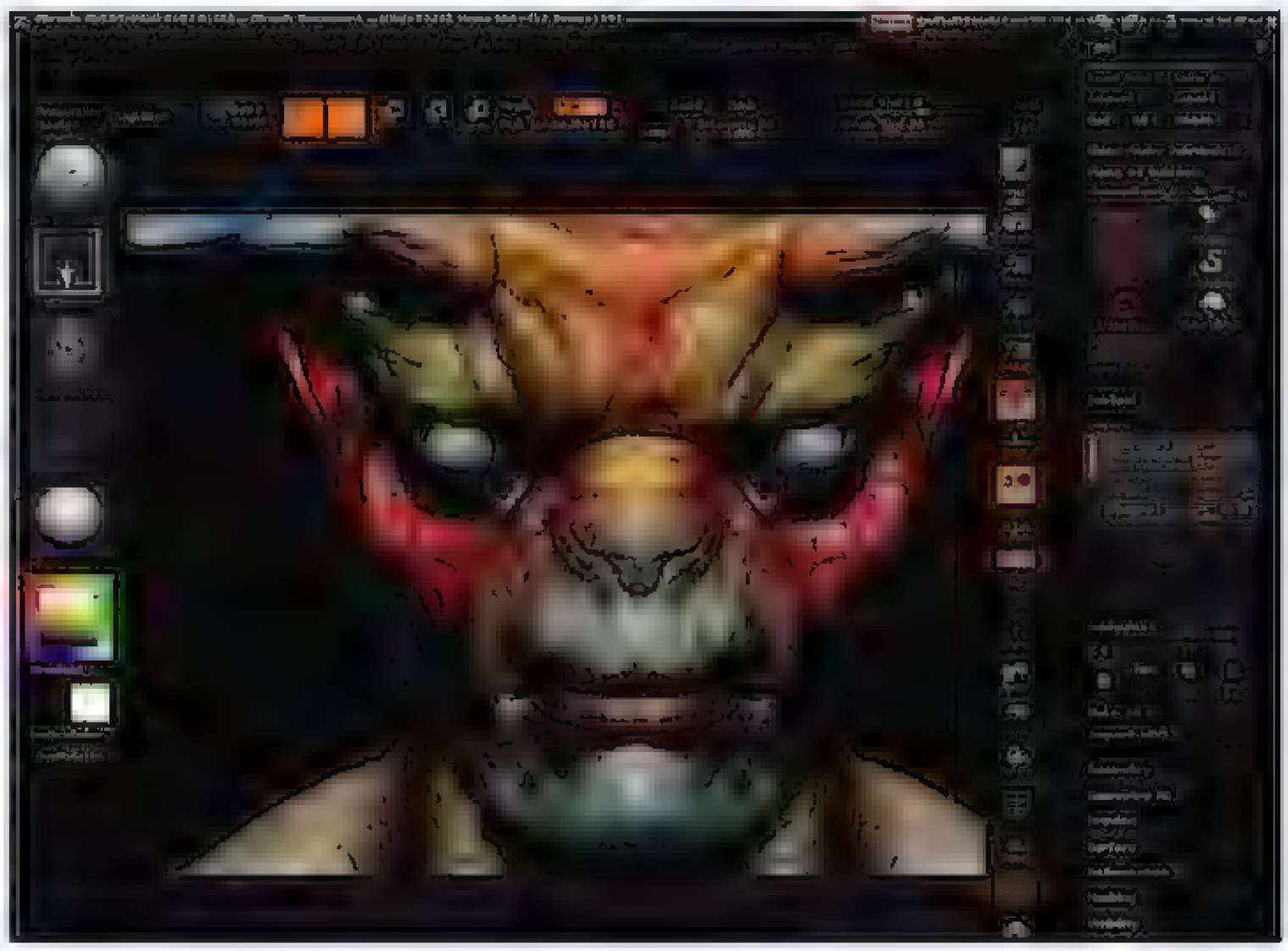
If you look closely enough, you can find flecks of various colours on most organic surfaces. These mix together to cause your brain to perceive more complex colour combinations. This effect is called optical mixing. This is how the paintings of Seurat and other pointillist greats work, they give the impression of a colourful image when they are composed of thousands of dots. Colours tend to blend in the eye when placed close together. For example, if you put two patches of coloured dots together – in this case yellow and blue, the areas where the two patches overlap will be perceived as green. You can vary the intensity of the saturation and the hue by varying the amount of the primary

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Video 3 00:05
A subtle layer of white squiggles is an easy way to suggest variations in skin pigmentation



Video 4 00:05
Unite your layer work so far with a second beige layer, this time applying variation as you paint

colours involved. This is the same process you'll use in this stage

Video 3 00:05
The mottling pass

So far you've laid in two layers of colour: the base layer, a solid layer of light beige; and above that, the spatter layer, a colourful map of temperature variation across the face. Now you'll add two more layers to start to tie these passes together into a skin texture

The next pass is called a mottling or squiggle pass. Create a new layer for this pass. This is where you simply add a layer of white squiggly lines right across the surface of the head. These lines will help create depth later in the painting by helping to give a sense of variable depth to the pigmentation in the skin. They also help to create the impression of blood vessels and pigment variation. You can see this in action in the accompanying video.

The most important part of this phase is to keep the squiggles light and make sure that areas of colour peek through between the lines. I use the Standard brush with a FreeHand stroke, or the DragRect stroke combined with Alpha 22, for doing this work

Video 4 00:05
The overpaint pass

When the squiggle pass is complete, create a new layer, where you'll paint a very light pass of the original base colour; polypaint in the case of this model. This pass helps to tie the three previous layers together. The base colour sets the palette; the spatter pass modulates the underlying colour temperature and adds variation, and the squiggle pass helps create depth by modulating the saturation of the underlying paint when viewed through this top overpaint layer. Don't worry if this is not completely clear: it's much easier when you see it in action on the video.

Select the custom spatter brush you created earlier so you can vary the intensity and opacity as you paint this layer. Set Rgb Intensity to 40. (You may lower or raise this value based on your own preferences, but this should work pretty well.) The idea here is to put down a very subtle pass of colour, so repeat the process to build up opacity in areas as needed. This will push back the appearance of the layers painted so far and start to give it the feeling of skin. You'll also end up muting a lot with this pass, so you'll have to work back in with more colour later

Stage 2

Detailing the skin and horns

In this section, you'll address the final stages of the texture. We'll look at how to apply photo reference to the horn using the free ZBrush plug-in ZApplink. We will also look at some distinctive masking tools in ZBrush. One you'll use extensively is Cavity Masking, which enables you to isolate your brush effect to either the raised or lowered surfaces



Video 6 00:54
ZAppLink enables you to bring in photo-reference as the foundation for your horn texture

of a sculpture. You'll use it to mimic a real-world painting technique called drybrushing.

Video 6 00:54
ZAppLink for the horn texture

The free ZBrush plug-in ZAppLink is available at **pixologic.com/zbrush/downloadcenter/zplugins**. It enables you to combine the strengths of ZBrush and Photoshop by creating a seamless connection between the programs. Essentially, ZAppLink lets you export your document view to Photoshop, where you can use any of the Photoshop paint tools for texturing. Then you may return to ZBrush, where the newly painted detail will be projected into the polypaint. It's an efficient method of working, and compliments ZBrush's internal Spotlight paint tool well. You'll use ZAppLink to project photo reference of an animal horn onto the demon's horn.

When using ZAppLink, you need to make sure your document size is large. Increase the document size via Document > Double. Once the document is enlarged, press [Ctrl]+[N], redraw the ZTool and enter Edit mode. The reason for increasing the document size is that ZBrush will project the texture detail through the document. If the resolution is too low, you lose detail.

It's worth noting that you can project photo reference in ZBrush using Spotlight without losing detail. The drawback is that Spotlight lacks the flexibility for warping and editing the photo that's available in Photoshop.

Video 8 00:05
Detail the horns

Cavity masking enables you to isolate the raised or recessed areas from the brush stroke, so you can paint colour into just the peaks or the recesses. This is extremely useful for highlighting texture and accentuating the rough surface of the horns. It can also be helpful when working on heavily textured areas of the face. Here you'll use it to accentuate the highlights and shadows of the horns.

To use the cavity mask, select Tool > Masking > Mask by Cavity to mask the whole head. If you find the mask view distracting, turn off Tool > Masking > ViewMask. Using your custom spatter brush, spray a light brown colour on the horns. The recessed areas will be protected from the colour spray by the mask. [Ctrl]-click on the background to invert the mask if you decide to paint darker colours into the recesses.

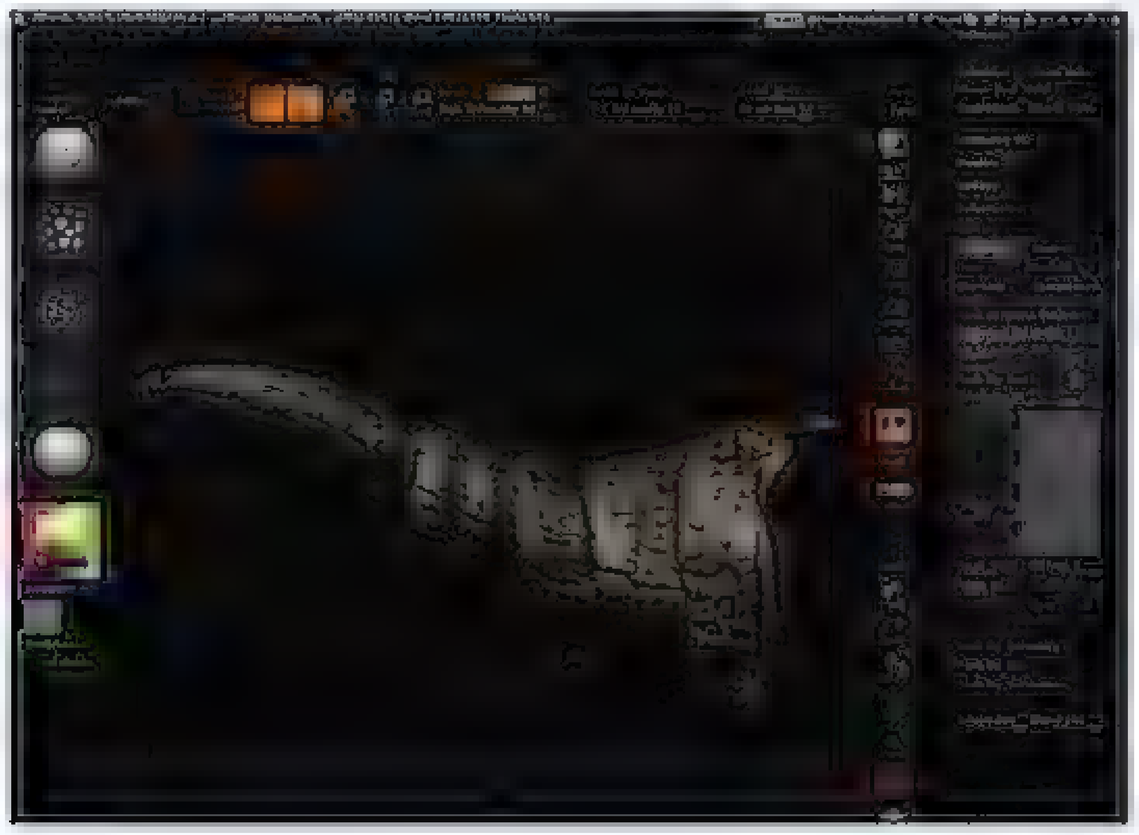
Video 9 00:05
Skin markings

I create skin marks with the Standard brush. Keep them on a separate layer so you can create a variety of spot patterns without disturbing the underlying paint scheme. Remember that you can erase polypaint by pressing [Alt] while you stroke.

I also like to add freckles and other imperfections to the texture: it helps add depth and realism to the skin. It can also help contour the shapes of the sculpture by adding subtle shading, much like someone might apply shading in make-up to shape or accentuate aspects of their bone structure.

To create freckles, select Alpha 46 and a Spray stroke. Select a raw umber hue and dial down the Draw size to create small clusters of freckles. You could try the DragRect stroke and Alpha 07 instead to more accurately place freckle clusters.

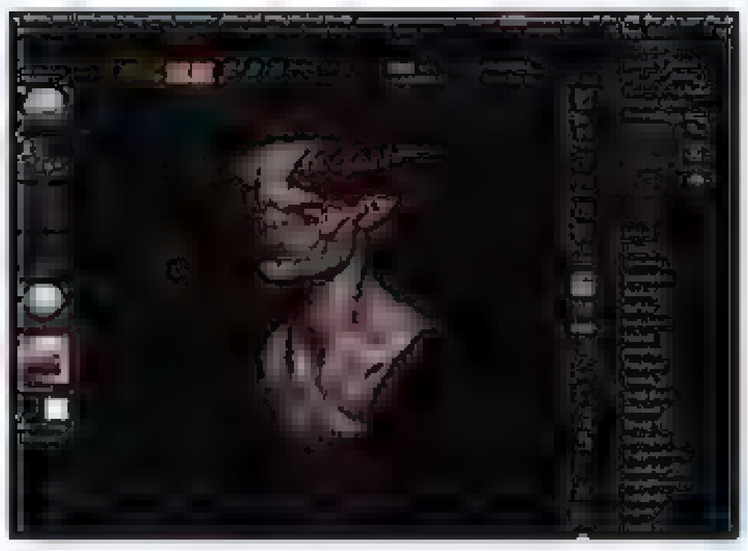
To contour-shade, select Alpha 07 and a neutral brown. I find that R 72, G 66, B 53 works well for this. Dial down Rgb Intensity to 20 and start to spray into the recessed areas. The effect should be subtle, so build it up slowly. Don't neglect this stage: it can make a huge difference in accentuating the form of your sculpture.



Video 8 00:05
Use cavity masking to paint only on the raised parts of the horn and accentuate its depth

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Video 9 00:05
Add freckles and other marks to the skin on a separate layer to you can control their strength without affecting underlying layers



Video 10 00:05
The finished demonic skin texture is ready to bake onto a UV map, so that you can export it to a 3D package of your choice

Stage 3

Finishing touches

This is the section where we tie all the elements together and arrive at the final painted character head. This can be rendered in ZBrush using the new BRP rendering mode or exported and rendered in the program of your choice. For this project, you'll finish off this project by baking your paintwork into a texture map. This will enable you to export the colour map for rendering in an external application such as Maya or 3ds Max.

Video 10 00:05
Bake the polypaint

The final step is to take your elaborate texture and create a map that conforms to your UV layout and can be exported and rendered outside ZBrush. ZBrush has a fully functional rendering engine as well as some animation tools, but for most professional pipelines, the ability to export a high-res texture map for a specific UV layout is essential.

Before you create a map, you need to ensure the UV layout is what you want. You can generate automatic UV coordinates via Tool > UV Map. Alternatively, you can use the free UV Master plug-in from **pixologic.com/zbrush/downloadcenter/zplugins** to generate human-readable UVs with minimal stretching. UV Master is an extremely powerful plug-in: I recommend downloading and installing it. You can also import a model with UVs into the ZTool, which will replace the existing UV Layout with the chosen one.

To check your UVs, select Tool > UV Map > Morph UV: this will unfold the head into its flattened UV view. When you have the proper UVs in place, simply make sure you are at the highest subdivision level. I often bake my layers just to save memory before these last steps. Via Tool > UV Map, set the resolution to 4096, then select Tool > Texture Map > New from Polypaint to bake the polypaint into a texture map.

To export this map, select Tool > Texture Map > Clone Txtr. This copies the texture to the main texture palette at the top of the screen. The texture can be exported from here.



SKIN DETAILS
CREATE CONVINCING SKIN PORES AND WRINKLES FOR YOUR CHARACTER SCULPTS

I touched on skin detailing when I sculpted the demon bust last issue, but I'd like to take a more in-depth look at detailing the head. You often want to achieve a skin texture you that is not represented in either the default ZBrush skin alphas or third-party alpha libraries. Luckily, it's simple to create your own custom alphas for any type of skin texture you may want.

Pores are round in some areas and directional in others. You'll create an alpha for each pore type now. Select any alpha from the Alpha palette, then select Alpha > CropAndFill. Now select Layer > Fill to create a layer of depth. This is like priming a canvas, giving you a surface to work on. Using the Simple Brush and Alpha 01, sculpt small, round pores. (Make sure the brush is set to ZSub.) Round pores are usually found on the forehead, the cheeks and the nose tip.

Sculpt a few pores clustered in the centre of the document, then select Alpha > GrabDoc. This will capture the document depth as a greyscale alpha in the Alpha palette.

To create another alpha, fill the canvas as before. This time, draw the pores as the small elongated lines found on the nasolabial area, where pores tend to stretch. Grab the document as an alpha as you did before. These alphas can be saved by exporting them via the Alpha menu.

Now that you've created two custom alphas, let's put them to use and create an overall layer of texture on the head. Make sure that the pores are isolated in their own layer so you can easily show or hide their effect or adjust their intensity. Step up to the highest subdivision level and open Tool > Layers. Click the New Layer button. While this layer is in record mode, any new detail sculpted in will be added to this layer. This can be helpful if you get a request to change the detail pass on the character later. If it was baked into the sculpture itself, it would be hard to change.

Select the Standard brush. Change Stroke to DragRect and select your circular pore alpha. Drag anywhere on the head and you will see how the texture is scaled and rotated in place as you drag the pen.

For wrinkles, I use a combination of freehand sculpting and texture stamps. I like to consider where and how skin wrinkles before applying any texture. Areas with high mobility will have more concentrated deep wrinkles than less mobile areas. I also plan the flow of the wrinkles across the whole head by sketching in a few lines at the start using the Standard brush and Alpha 01. This is a map or guide to help me place wrinkles later.

For more specific wrinkle patterns, use an alpha texture stamp like you did for the pores. A wrinkle pattern for around the eyes, created by Aaron Simms, is included in ZBrush as a bonus. Be sure to clean it up using the standard sculpting tools.

Wrinkles are never straight regular lines: they tend to be broken sketchy lines which often crosshatch to create overlapping patterns in the skin; Alpha 58 is useful here.



PolyTrans and NuGraf

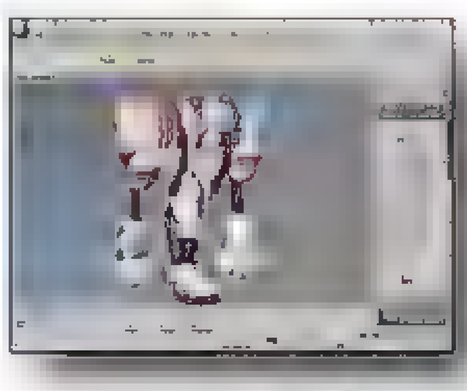
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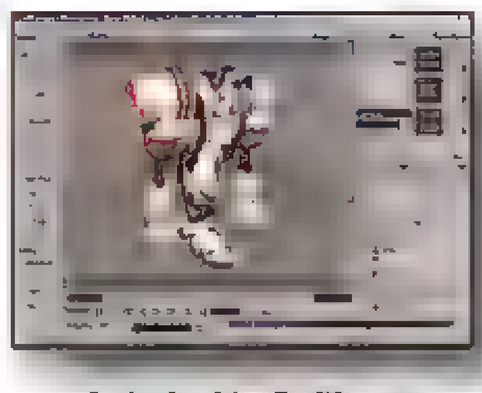
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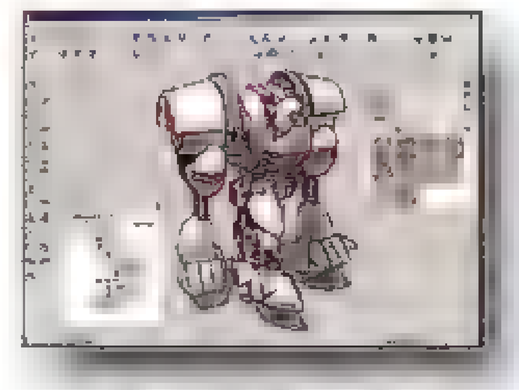
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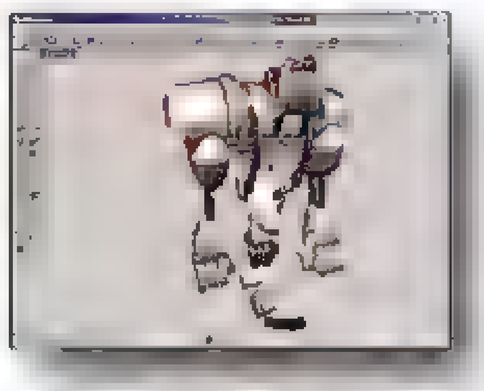
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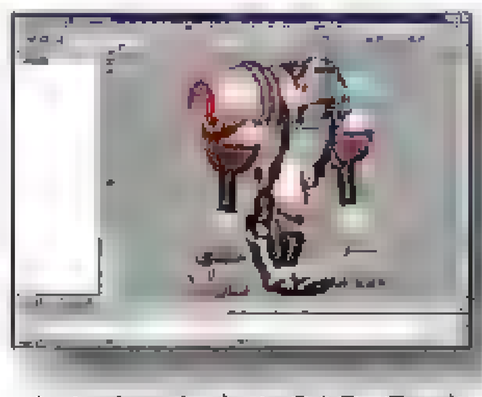
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Using an HDR image as a light source is a great way to introduce detail to your render

Dynamic lighting

PART 7 Continuing our series on lighting, Michael McCarthy explains how take advantage of high dynamic range imaging

HDRI stands for high dynamic range imaging, and it's an exciting and interesting way to light a scene. HDR images can carry more information than a standard image. With normal images, a point like the sun or a star in the sky doesn't have enough intensity information to use as a basis for lighting, but HDR images are ideal for this purpose. HDR images also tend to be created in such a way that they can be mapped on a sphere or environment inside your 3D application, which makes them great for an environment reflection map. The combination of environment lighting linked to reflections can produce a realistic final render that ties everything together.

HDR lighting usually requires a global illumination renderer such as mental ray or V-Ray. There are many ways to set up both lighting and reflections using HDRI. A common practice is to create a sky dome, using a hemisphere that has its normals flipped inward. You can then increase the illumination and output of the image mapped onto it. This will provide an environment to reflect, as well as a source for the renderer from which to create lighting. Another option is to use a skylight light type that has a slot for an HDRI map or options for using the environment to calculate light. 3ds Max, Maya and many other applications have a light type like this.

First, you need an HDR file. There are many options for getting the right file, but you can download a free test file from: ict.debevec.org/~debevec/Probes/ **stpeters_probe.hdr**. (Paul Debevec's site is a great resource for HDRI files and information.)

Next, open Lighting\Part07\Start.max from this tutorial's scene files. This scene has a simple device with lots of bevelled areas to catch light. Materials have been set up with different reflection values. If you do a quick render, you will see there are no lights in the scene, so the materials don't have a lot to reflect. Open the Environment dialog and place stpeters_probe.hdr into the Environment Map slot. By default, the image will be set to Screen environment. Drag the map into the Material Editor from the Environment dialog and set it to a Spherical environment projection. When you render, your object now has more believable reflections.

Next, set up the lighting using the HDRI as the source. Create a Skylight in the Top view and set it to Use Scene Environment in the Modify panel. Turn on Final Gather in the Indirect Illumination tab of the Render dialog. Final Gather calculates based on the HDRI lighting the scene. Increase Skylight to 2.0 to get a slightly brighter render. Finally, add a Direct light with Ray-traced shadows to cast some solid shadows and light on the object and floor. Set Multiplier to a lower value of 0.5, since the environment is already casting a good deal of light in the scene.





About the author
Michael McCarthy is a VFX TD and Autodesk Certified Professional. He has worked in the games industry for over 10 years and is currently employed at Blue Sky Studios in Greenwich, CT. You can see more of his work at mmccarthy.com

Next issue: Part 8
In the final part of the series, Michael focuses on animating lights to enhance your scenes

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Mudbox

"How do I create a vector displacement stamp from an existing model?"

Dmiles, from the forums

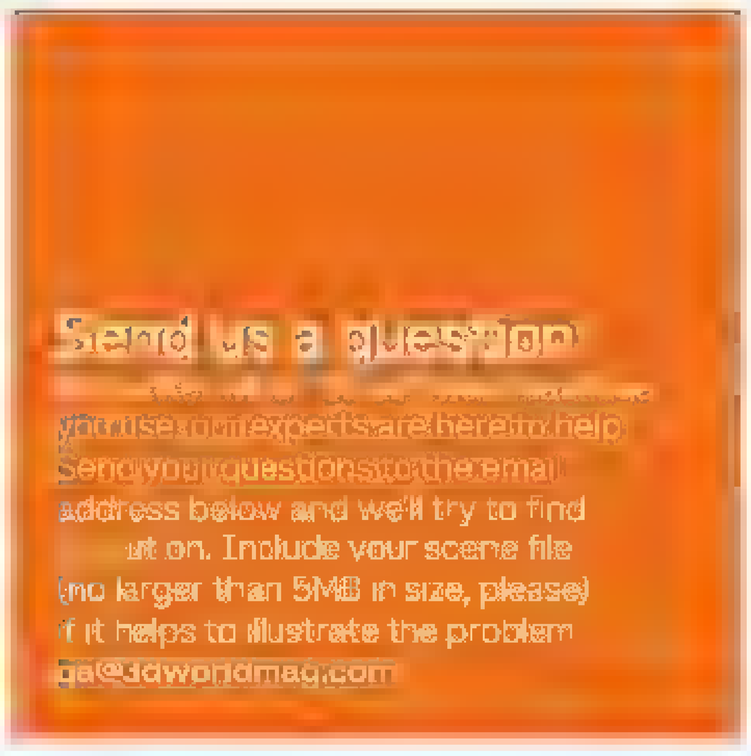
Craig Barr replies:

When it comes to creating highly detailed stamps and stencils to be used in a sculpting workflow, the vector displacement method in Mudbox cannot be beaten. For the creation of stamps and stencils, vector displacement requires that the target mesh must have the same topology as the source mesh.

There are a few tricks for achieving this. Once you understand the process, creating a stamp is easy.

The key to creating a vector displacement map from existing geometry (or from a portion thereof) is to create a regular displacement map as a starting point. Mudbox provides two ways to do this: via the map extraction UI, for more accurate results using a higher bit-depth image format, and directly within the viewport filter, for quicker results. Let's take a look at both methods.

First, create a simple plane by selecting Create > Mesh > Plane. Leave the default settings for the plane as they are. This plane will be your background for baking the displacement map. Next, import your model via File > Import. In this example, I'm using a model of an old, beaten-up car. Be sure the model is placed at the origin, facing up in the Y axis. Any details you wish to capture in the map should be pulled up above the plane. Use the transformation tools in the Select/Move Tools tray if your model is not positioned in this manner.



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For the 'quick and dirty' method to create a simple displacement map, go to the Object List tab (top right corner beside the Layers tab). Right-click on the Top camera and select Look Through. You're now looking down the Y axis. Zoom in and frame the plane to within the boundaries of the viewport. You can also pull the edges of the viewport to fit the exact square-shape of the plane as well.

Next, go to the Viewport Filters tab (in the top-right corner by the Layers and Object List tabs) and toggle Screen Distance on. Click the Save 16-bit Image button in the Screen Distance Properties tab and select a location to save. For other image formats, select Render > Save Screen Image and select the resolution, image format and save location.

This method is fast and effective, but it's limited to working with 8-bit images. The higher the bit depth of the image is, though, the more accurate the data from the model will be, yielding better results in your stamp. That's where the alternative method for creating a displacement map comes in.

To use a higher-bit-depth image to store more detail, first select Maps > Extract Texture Maps > New Operation. Select Displacement Map. In the Target Models space, click Add All, then highlight and remove everything else except plane. In the Source Models space, click Add All; this time, highlight and remove the plane. In the Search Distance box, click Best Guess for an appropriate envelope to calculate the sampling. Select your image size. (1K is fine for most circumstances; remember you are just using this map as a starting point to sculpt with.) Down in the Base File Name box, click the envelope icon, select your path and then choose an image format. The higher the bit depth, the more detail you will preserve in the map.

Now select File > New Scene followed by Create > Mesh > Plane. Subdivide the plane up a few levels (to at least Level 6). Import your displacement map as a stencil into the Stencil tray by selecting the arrow icon and then Add Stencil. Select the Sculpt Tool and then use the [S] key to position the stencil over the plane. Create a new sculpt layer. You will need to adjust the strength of your Sculpt Tool to displace the geometry to the closest depth of the original mesh.

Once you've used the displacement map to re-create the base model shape, it's up to you to sculpt and change the mesh to your desired effect. In the video, I show a displacement map that I use as a base mesh compared to a final vector displacement map. The regular displacement map provides a starting point for some simple sculpting. Don't be afraid to use the Pose tools to bend or twist the geometry as well. Vector displacement is accurate for storing overhanging and undercutting geometry, as well as very smooth or fine details.



Craig Barr is a technical marketing specialist at Autodesk, focusing on in Mudbox and Maya. He's worked in film and games
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Cinema 4D

"How do I target my camera on the end growth of an animated Sweep NURBS?"

Håkan Nilsson, via e-mail

Anders Kjellberg replies:

The easiest way to do this cool animation effect is by attaching some XPresso code to a Null following the growth of the spline, then having your camera in turn target the Null. To try it, open the start scene that you'll find in this Q&A's scene files. In it, you will find a Sweep NURBS that spirals around an ice cream, with the End Growth value animated from 0% to 100%.

To get the camera to target the end growth of the object, start by creating a new Objects > Null and name it CamTarget. Right-click CamTarget and add CINEMA 4D Tags > XPresso tag. The XPresso Editor will open; position it so you can see the Objects Manager. Now drag the object named CandyStripe into the XPresso Editor to create a new node. Expand CandyStripe and drag the Path spline into the XPresso Editor as well. Right-click on the editor canvas and add New Node > Xpresso > General > Spline.

Click the red square on the Path node and add an Object port. (Red squares manage outputs, blue inputs.) Drag a connection line from the Path node's Object output to the Object input on the Spline node. Let go when the line turns green to confirm the connection.

Now click the red square on the CandyStripe node and add a port for Object Properties > End Growth. Drag a line from this port to the Offset input on the Spline node. Now drag the CamTarget from the Object Manager into the XPresso editor to create a node for it. Click on the new node's blue square and add a port for Coordinates > Global Position > Global Position. Drag a line between the Spline's Position port and the CamTarget's Global Position.

You can now close the XPresso Editor and press Play on the timeline to check the progress. The CamTarget is now following the Path spline, but it's out of sync with the end growth. Double-click the XPresso tag and select the Spline node. In the Attribute Manager, enable Use Uniform Distribution. Close the editor and play the animation again: the CamTarget should now line up perfectly with the actual growth.

Finally, select IceCamera in the Object Manager, right-click and add CINEMA 4D Tags > Target, and drag the CamTarget from the Object Manager into the Target Object Field.

With the help of XPresso, you can position the CamTarget to exactly follow the growth in your animation

Anders Kjellberg is a freelance 3D artist residing in Sweden. He produces work for print and broadcast media
dogday-design.se

Maya

"What's the fastest way to create a brushed metal material?"

Kurt Himel, via email

Frat Enderoglu replies:

If you're using mental ray to render your scene, the fastest and easiest way to achieve a metal look would be through using mia_material_x. This material, which uses the same underlying code as mia_material, is designed to help you reproduce many of the materials used in architectural renderings. It's got great support for glossy reflections and refractions, and there's so much you can do with it. With just a few adjustments, for example, you can easily get a realistic brushed metal look.

Start by opening up start_scene.ma from this Q&A's scene files. Assign mia_material_x to both objects. Unless you have a slow computer, I would recommend starting an IPR render to see the results of your changes; I believe it's the best way to play around with shaders to figure out how to get the best control over it.

Start by changing 0 Degree Rotation in the BRDF section to a value close to 1. This will start giving a chrome look by allowing overall reflections from the material. After that, you'll want to adjust Anisotropy to get the specular highlights to be longer instead of rounder. I find it preferable to go with a lower value, say around 0.1.

At this point, the object should start to look like metal, but it's still missing that distinctive brushed look. To achieve that, lower Glossiness in the Reflection section. You'll notice that once you lower

3ds Max

"How do I create mirrored UVs?"

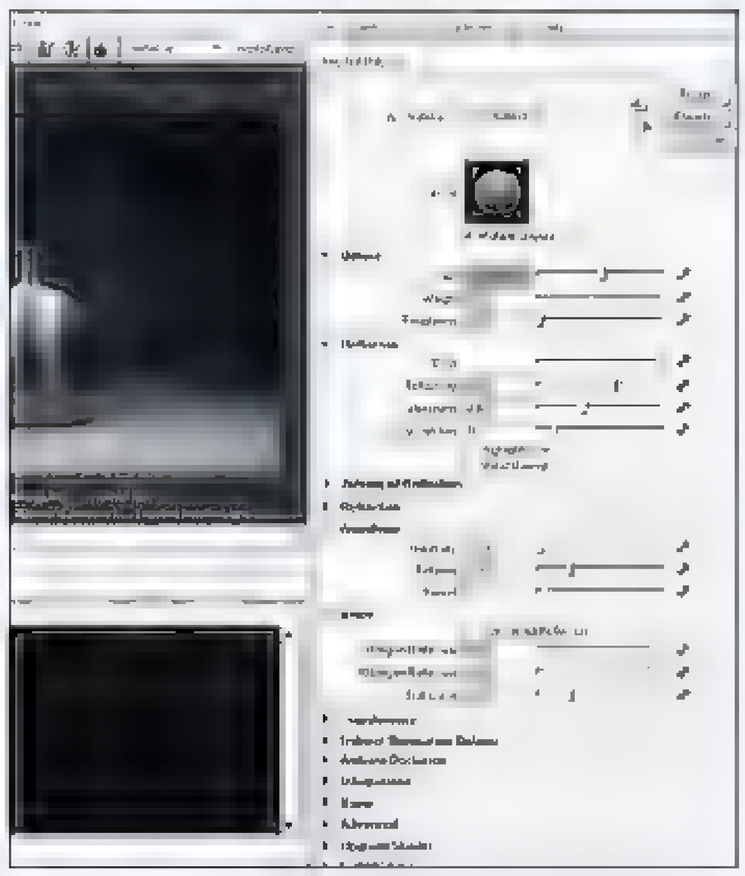
Stephen B, via email

Cirstyn Bech-Yagher replies:

Using your modeller's mirroring or symmetry function while UV mapping is one of the best time-savers around. The basic technique is the same whether you've created a hard-edged or organic model: split your mesh down the middle, delete one half, map the remaining half, and mirror the mesh. Depending on complexity and texturing requirements, you can keep the UVs stacked, or flip some or all shells. When you're done mapping, you can tweak both mesh and texture, if needed, to make it look less symmetrical. Although I'm using 3ds Max for this example, the principles apply to other UV-capable 3D packages.



Cirstyn Bech-Yagher is a 3D freelancer, and is currently working on a series of tutorials aimed at newcomers to 3D
northern-studios.com



Key settings to establish the brushed metal feel include a relatively low Glossiness setting. Adjusting Anisotropy can also help

that value, Glossy Samples will be enabled. Change this value to 16 while fine-tuning the material, but be sure to up this sample value to something like 32 or 64 for your final render.

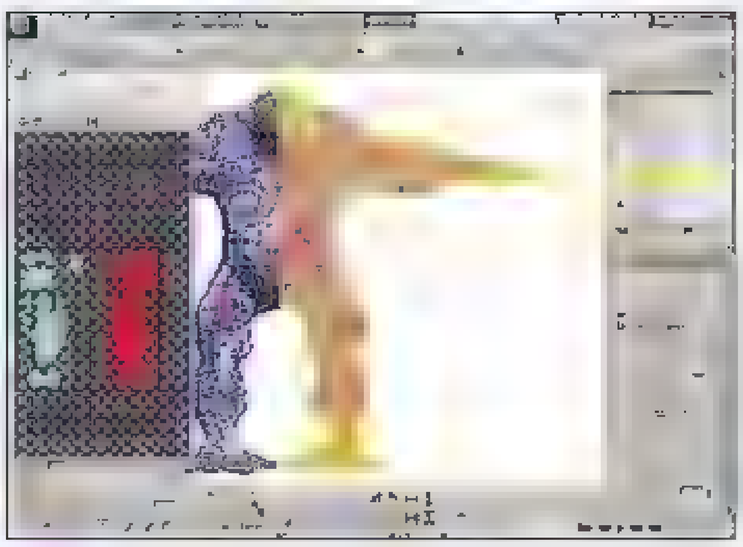
One last thing that you'll want to assert some control over is the direction of the anisotropic specular. In the Anisotropy section, adjust the Rotation value to your liking.

This is all you need to make a basic brushed metal material, but you can adapt it for many situations. Depending what your object is, you'll need to adjust these values separately, and you might want to paint some maps for basic attributes such as reflectivity and colour. mia_material and mia_material_x are powerful materials. I would recommend that you play around in each section to see what you can achieve with just a few adjustments.

Firat Enderoglu is a senior pipeline TD at Sony Pictures Imageworks. He's heading the character pipeline for The Amazing Spider-Man

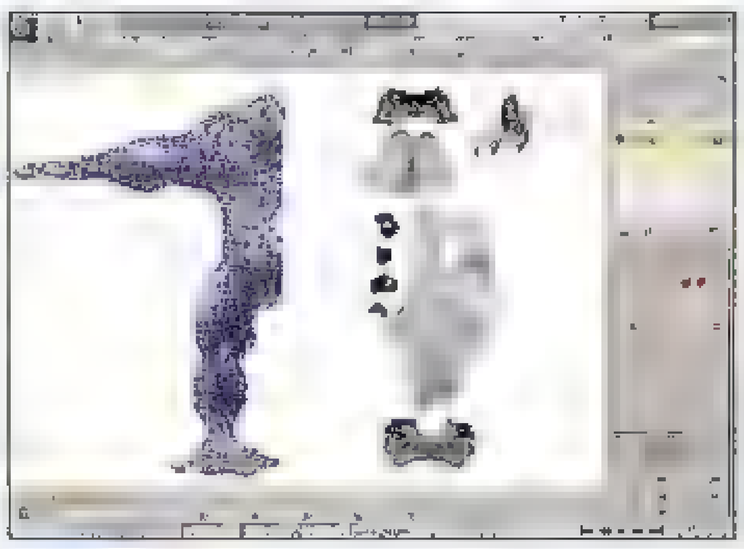
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01 Set the scene

Regardless of whether or not your starting point is a box-modelled mesh, ensure a clean start by having a half-mesh to start working with – either by splitting and deleting it down the middle, or simply deleting your current instance or Symmetry modifier. Unwrap your mesh. You can use either 3ds Max's native tools or an external UV mapper as you prefer. If you know the shells will need to be flipped or stitched due to texturing considerations, try placing the unwrapped shells in only half the UV space (0>0.5); having everything laid out in advance will make subsequent UV work much easier.



02 Apply the modifiers

Select the mesh, and apply the Symmetry modifier from the Modifier List dropdown. Set your mirror axis to X and untick Slice Along Mirror to avoid the mirror gizmo in the modifier acting as a Slice Plane. Leave Weld Seam ticked to weld vertices along the middle. Sometimes the default setting won't catch everything, so increase Threshold until most gaps are welded. Also consider doing manual (Target) Welds if the gaps are too big, as Symmetry Weld sometimes creates ugly welds. Add a UVW Unwrap modifier on top of the Symmetry modifier. The UV seams will now display.



03 Fix the flips

Your UV shells are now stacked on top of each other, and textures will render flipped on the other side of the Symmetry modifier. You can fix this by first unticking the Weld checkbox in the Symmetry modifier, to select only half the mesh, then going to the UVW Unwrap Modifier. Here, select Faces and tick Select by Element in the Unwrap UVW rollout. In the same rollout, click Edit under Parameters to access the UV Editor. Select Tools > Flip Horizontal in the UV editor menu to flip the UVs so the texture will render correctly. Go back to the Symmetry modifier, and check Weld to turn welding back on again and restore the entire texture. Stitch and tweak any UV shells as needed to finish.



The final render shows how the image maps result in easy-to-manage fur

modo

"How do I use images to manipulate fur?"

Nick Burgess, via email

Matthew Burnston replies

Whenever you're mapping images to surfaces, the best way to control them is by creating a UV map. First, unwrap your model using a UV tool, either within modo or by using another 3D application of your choice.

Now it's time to add the fur. First, select the polygons in the viewport that you want to apply fur to, then press [M] to apply a new material. Name the material and click OK. In the Shader Tree, find your new material and add a Fur Material by selecting Add Layer > Special > Fur Material. You will see a guide hair appear in the viewport if you have done this correctly. By default, modo uses the Material's Diffuse Color value to shade the fur. Whatever colour you select will be transferred to the fur strands, so go ahead and choose your colour in the Diffuse Color selection box.

If you press [F8] for a preview, you'll see fur appearing through parts of the model you may not have wanted. If you're using my example scene, you'll see hair through the patches on the chest and feet. To fix this, you'll paint a density map. Start by selecting Add Layer > Image Map > New Image. In the pop-up, name your file and choose JPG. In the next window, select 2048x2048 and RGB, tick the Set Color box and choose white in the colour picker, then click OK.

After Effects

"How can I simulate text being cut out?"

Robert Knapman, via email

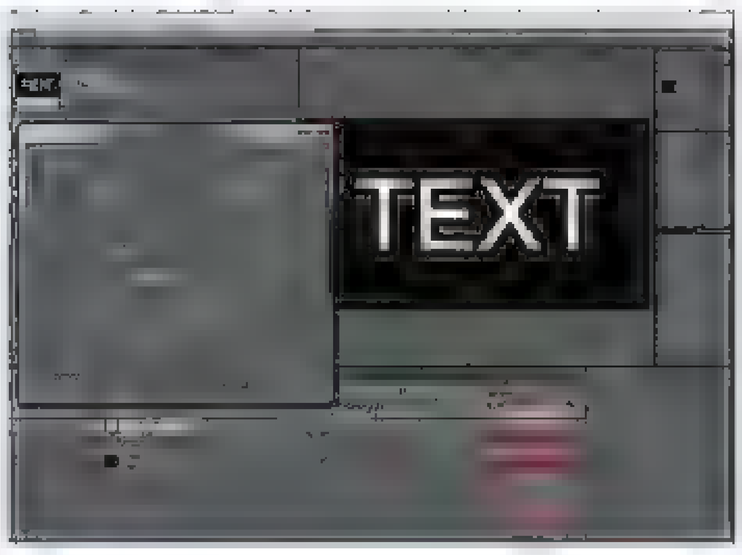
Andy Davenport replies

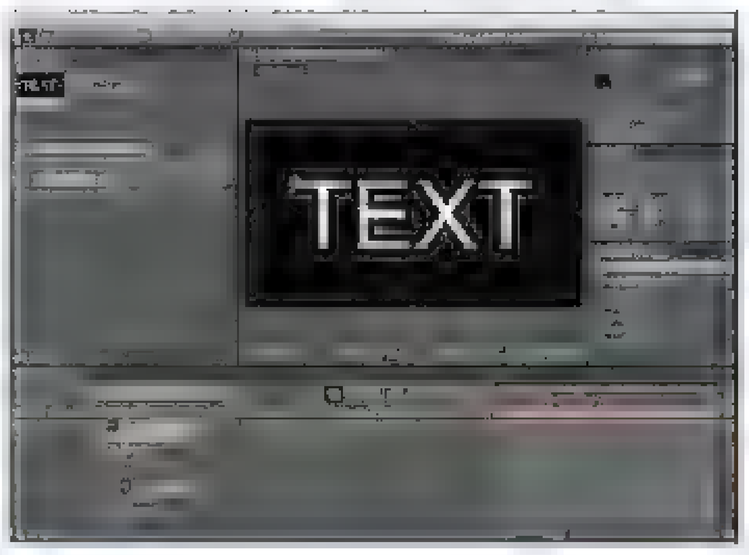
It's quite simple to animate a cutting effect along a path, but trickier for text. Drawing a mask path around every letter would be time-consuming, so this Q&A will demonstrate a much quicker way to do it. You'll use Auto-trace to create accurate mask paths around each letter, then use those paths to animate the position of spark effects, created with a particle system. This effect will be duplicated for each letter, then altered slightly to create a glowing edge. See the accompanying video and finished scene file for tips on finessing the effect.



Andy Davenport is a motion graphics artist, 3D animator and compositor for the UK-based studio Mediastation

mediastation.co.uk



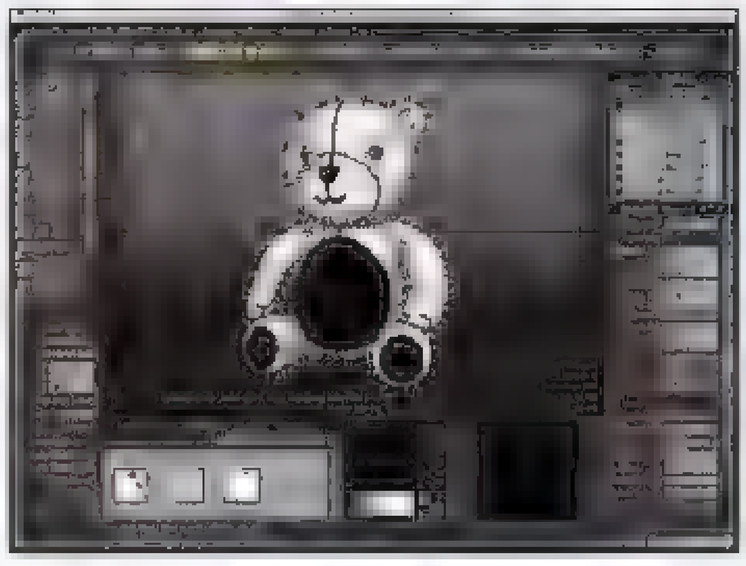


01 Create the animation paths

Open Cutting_Start.aep from this Q&A's scene files. Click the text layer and select Layer > Auto-trace. Make sure Time frame is set to Current Frame and enable Preview. Set Tolerance to 1px, then change Corner Roundness to 0% and click OK. On the newly created Auto-traced TEXT layer, press [M] to reveal its Masks. Click Mask 1's Mask Path to select it, and press [Ctrl]+[C] to copy it. Create a Layer > New > Adjustment Layer, with it selected, add Effect > Simulation > CC Particle Systems II. On the Timeline click the arrows to expand the effect properties: under the Producer section, select Position and press [Ctrl]+[V] to paste the mask path.

02 Animate the sparks

With the keyframes selected, select Animation > Keyframe Interpolation. In the dialog, change Roving: to Rove Across Time and click OK. Now select just the last keyframe and drag it out to the 4 seconds point. This will expand the length of the animation. In the Effect Controls, change Birth Rate to 1.0 and Longevity (sec) to 0.6. Under Producer, change Radius X and Y to 0.1; under Physics, change Animation to Fractal Explosive and both Velocity and Gravity to 0.2. At 0:00:03:24, click Birth Rate's stopwatch to add a keyframe. Press [Page Down] to move forward a frame and change Birth rate to 0.0.



modo's paint tools really help when creating image maps: you can draw directly onto the model to get fur exactly where you want it

In the Paint tab, select the Brush tool and set the foreground colour to black, then simply fill in the areas of your model where you don't want hair to grow. The image you're creating works by using a value from white to black to determine where hair will be generated. Anywhere that is white will have 100% density; where it is black, it will have 0% density, or no hair at all. Once you've finished painting your image, go to the Shader Tree, right-click the Diffuse Colour property in the effects column and select Fur > Fur Density.

If you render your image with [F9], you will see that the fur is only growing in the areas that were coloured white in the fur density image. In the example here, the same technique was repeated to create an additional image, which was set to Fur Length. Dark grey areas were painted to shorten the hair around the eyes, nose and mouth, making them more visible

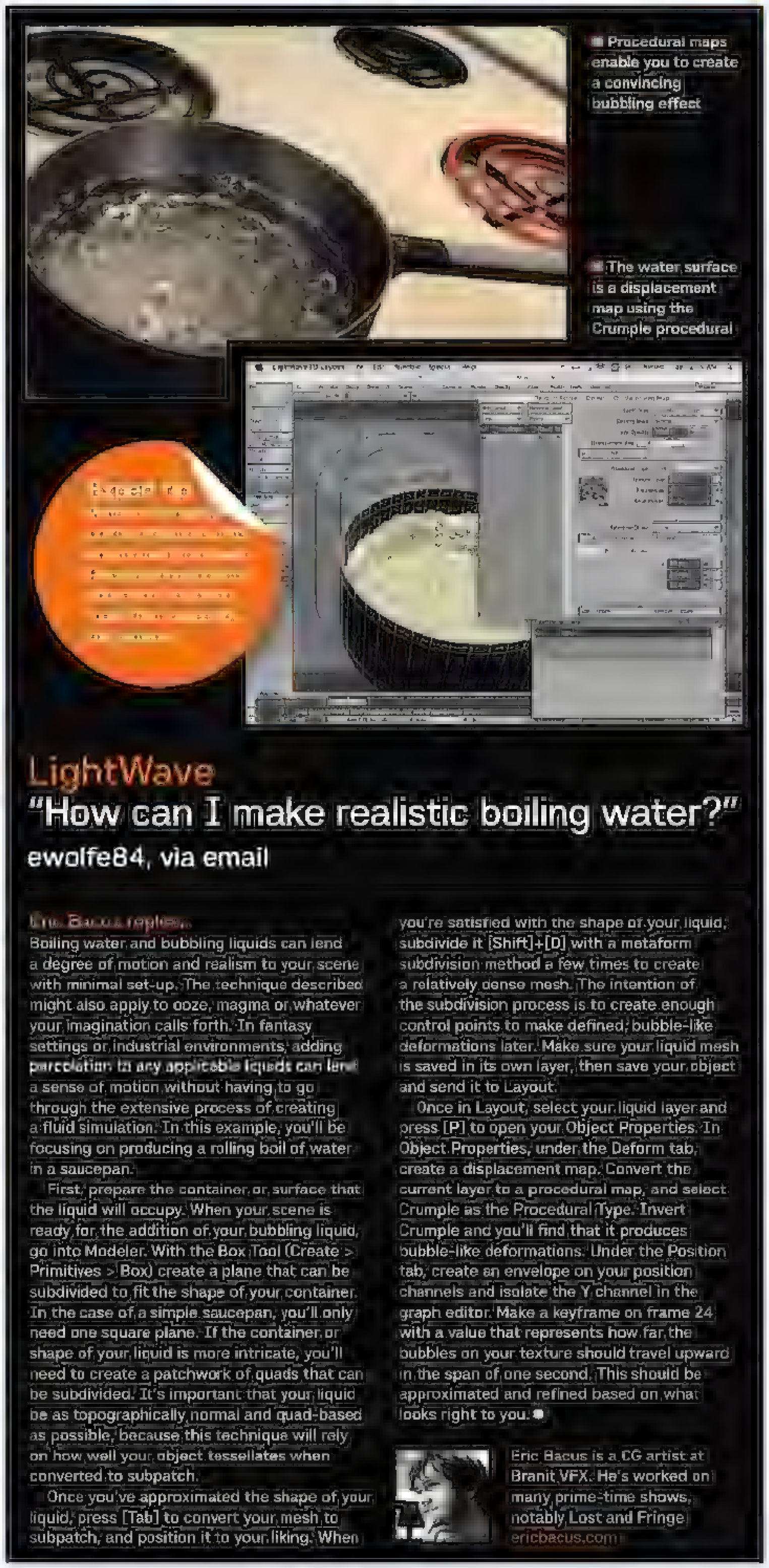


Mathew Burniston is a CG director at Rokkan in New York. He creates high-end 3D and video content for the web
[illegible]



08 Create the glow

Repeat the previous steps with the other three mask paths, so you end up with a 'sparks' layer for each letter. Select all four layers and choose Layer > Pre-compose. In the dialog, change the name to **Sparks**, tick Move all attributes into the new composition and click OK. In the Project pane, duplicate the Sparks comp with [Ctrl]+[D]. Rename it **Glows**, then double-click to open it. On each layer's particle properties, change Longevity to 4.0, Velocity to 0.0 and Gravity to 0.0. Add Effect > Stylize > Glow to both the Sparks and Glows PreComps.



LightWave

"How can I make realistic boiling water?"

ewolfe84, via email

Eric Bacus replies:

Boiling water and bubbling liquids can lend a degree of motion and realism to your scene with minimal set-up. The technique described might also apply to ooze, magma or whatever your imagination calls forth. In fantasy settings or industrial environments, adding percolation to any applicable liquids can lend a sense of motion without having to go through the extensive process of creating a fluid simulation. In this example, you'll be focusing on producing a rolling boil of water in a saucepan.

First, prepare the container or surface that the liquid will occupy. When your scene is ready for the addition of your bubbling liquid, go into Modeler. With the Box Tool (Create > Primitives > Box) create a plane that can be subdivided to fit the shape of your container. In the case of a simple saucepan, you'll only need one square plane. If the container or shape of your liquid is more intricate, you'll need to create a patchwork of quads that can be subdivided. It's important that your liquid be as topographically normal and quad-based as possible, because this technique will rely on how well your object tessellates when converted to subpatch.

Once you've approximated the shape of your liquid, press [Tab] to convert your mesh to subpatch, and position it to your liking. When you're satisfied with the shape of your liquid, subdivide it [Shift]+[D] with a metaform subdivision method a few times to create a relatively dense mesh. The intention of the subdivision process is to create enough control points to make defined, bubble-like deformations later. Make sure your liquid mesh is saved in its own layer, then save your object and send it to Layout.

Once in Layout, select your liquid layer and press [P] to open your Object Properties. In Object Properties, under the Deform tab, create a displacement map. Convert the current layer to a procedural map, and select Crumple as the Procedural Type. Invert Crumple and you'll find that it produces bubble-like deformations. Under the Position tab, create an envelope on your position channels and isolate the Y channel in the graph editor. Make a keyframe on frame 24 with a value that represents how far the bubbles on your texture should travel upward in the span of one second. This should be approximated and refined based on what looks right to you.

Eric Bacus is a CG artist at Branit VFX. He's worked on many prime-time shows, notably Lost and Fringe
ericbacus.com

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Nuke
VFX

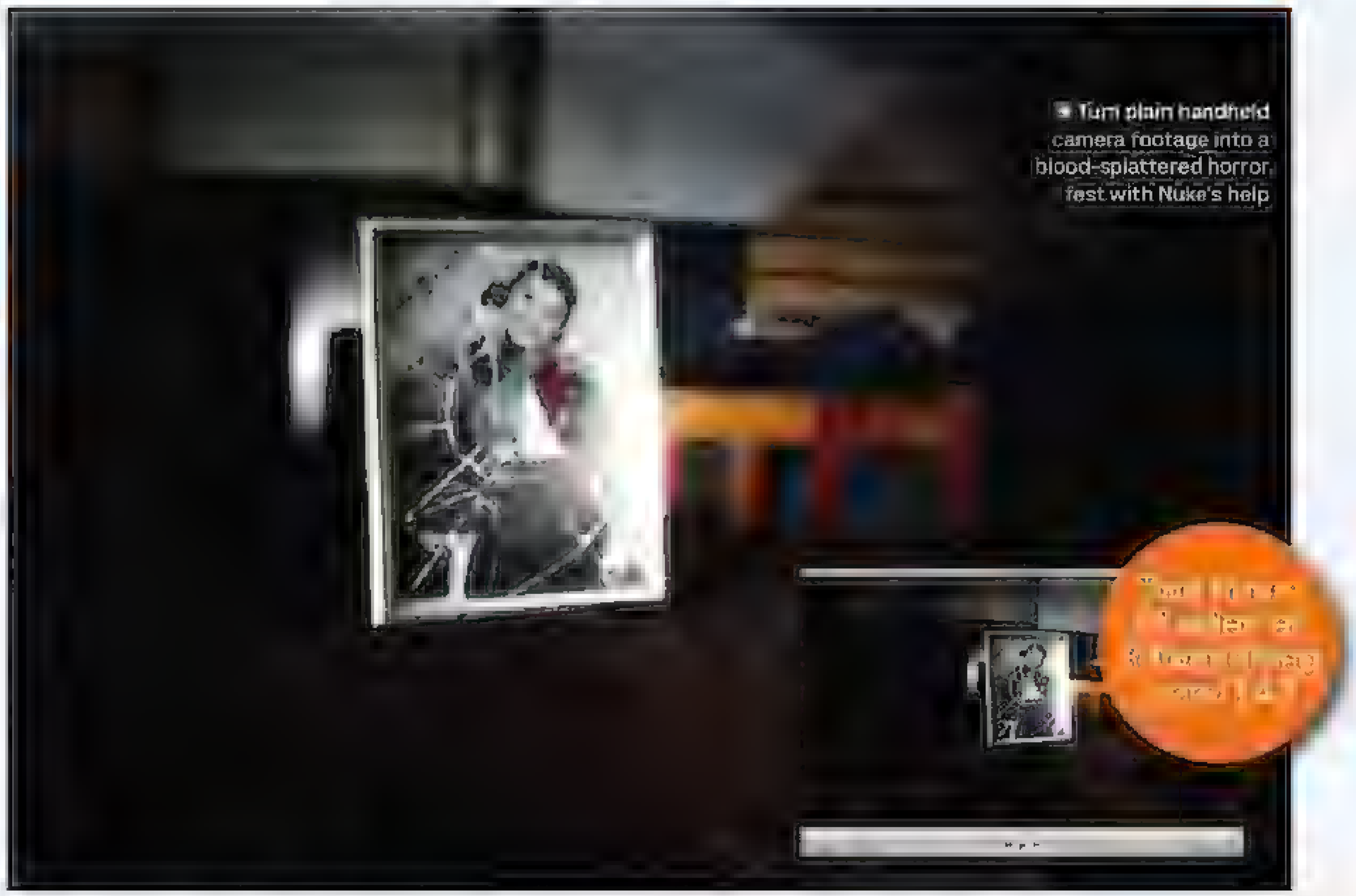
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3dworldmag.com/143



Create a horror movie in Nuke

Add Blair Witch-style effects to standard footage as **Hugo Guerra** shows you how to combine video, 3D geometry and textures into a seamless, scary whole

With the advent of compositing applications like Fusion and Nuke, the borders of 2D and 3D are blurring. The entire system of projection, 3D tracking, simple lighting and shading inside a compositing application is growing in the pipelines of visual effects companies. Such techniques are not meant to replace a 3D pipeline, but they will support and develop new ways of compositing, simple matte painting, roto, clean-up and relighting, making the entire pipeline faster and more in sync with the 3D department.

In this tutorial, I will show some of the 3D techniques I have developed over the years inside Nuke. You will use NukeX's powerful 3D tracker to achieve some complex 3D operations inside Nuke without having to go to dedicated 3D software. You will track a plate, calculate lens distortion, project new textures and relight the footage using the 3D system. The idea is to transform a normal room into to a creepy 'survival horror' environment, with blood, dirt and a fake flashlight effect.

I'm assuming some knowledge of Nuke's 3D system and of compositing prior to this set-up. The following steps are simplified because of space constrains: please watch the video for a more detailed explanation of the workflow. Start by opening the 3D_Tracking_Start.nk script from this tutorial's scene files so you can prepare your footage for tracking. A finished version of the scene is also provided for reference and study. Don't turn the lights off while you work on this one...

*Thanks to Ron Ganbar (**ronganbar.wordpress.com**) for making footage available for this tutorial.*



About the author
[illegible]

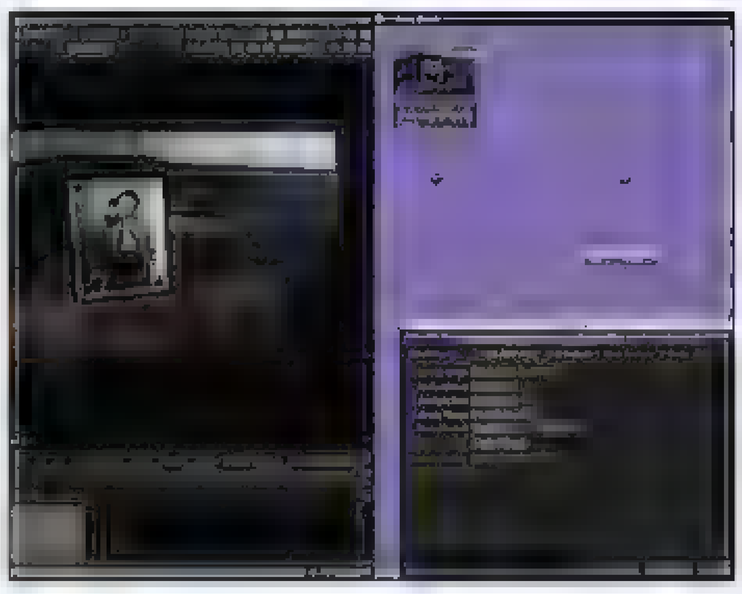


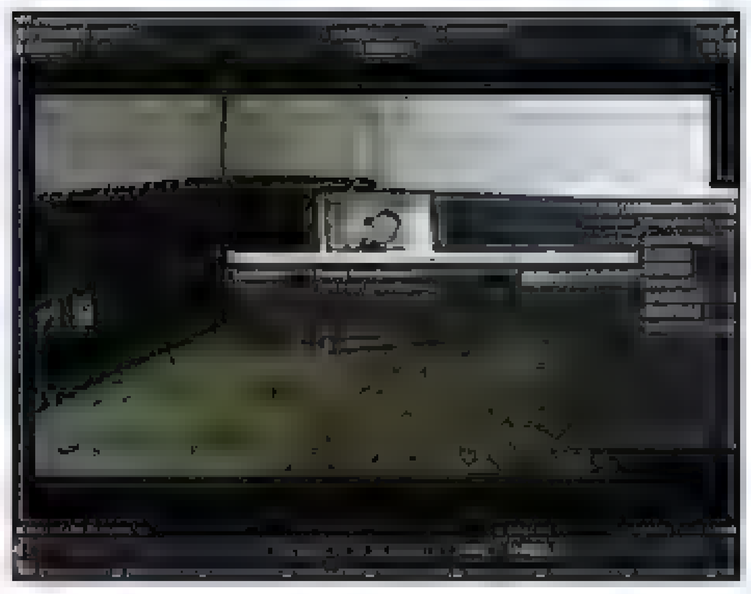
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STAGE ONE

Lens distorting and tracking

In this stage, you'll undistort the footage, then make a first pass of tracking with default settings. Always try the default settings first before making changes to the tracking parameters. You need to 'undistort' your plate prior to 3D tracking, otherwise you may get poor results in the solve, depending on how much lens barrel distortion the footage has. Tracking in distorted plates can lead to wrong points in 3D: in a 3D system, the image is always 'perfect', with no lens artifacts or distortion.





01 The LensDistortion tool

Via the Transform button in the left sidebar, select the LensDistortion tool. There are three ways of calculating distortion: Image Analysis automatically calculates the distortion, Grid Analysis calculates the distortion by using a grid filmed on location, and Line Analysis calculates the distortion by hand-drawing lines in the footage. You'll be using the Image Analysis method.

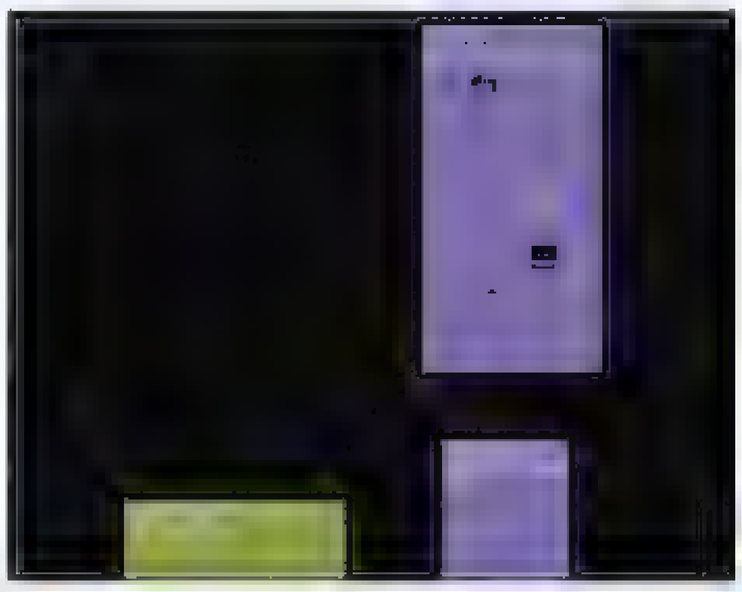
02 Undistort the footage

In the Image Analysis tab, click Analyze Image to start the process of tracking features in the footage and calculating the distortion. If we had footage with a lot of moving objects or people, then I would recommend you make a few garbage masks and use the Mask Channel option: this prevents the tracker from tracking features in moving objects and giving you a bad track.

STAGE TWO

3D tracking

NukeX's powerful 3D tracker node will help you create a full 3D scene from the footage. The more information about the room and the camera you have, the better. If you are on set, try to get the lens information, film a distortion grid and measure the room. All this information can make the difference between a average track and a good track.





06 CameraTracker node

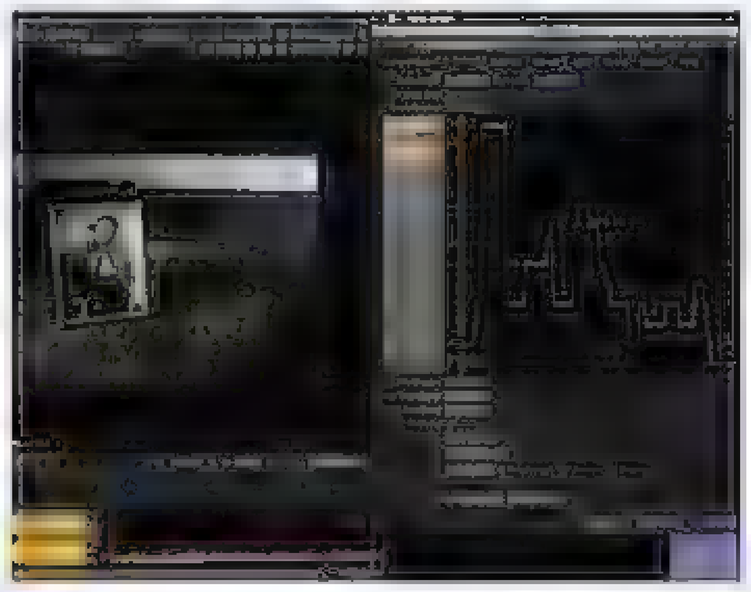
Bring in a CameraTracker node via the sidebar's 3D menu. Connect it to the footage. At this stage, you should make two streams in the comp. One has the CameraTracker node and the footage without the STMap node; the other should be your main stream of the comp, coming from the STMap. This just makes it all tidy and simple for later.

07 Lens tab

The first CameraTracker tab you want is Lens, since you need to bring the lens distortion data into the node before you start to track. Open the LensDistortion and CameraTracker nodes side by side. In the Lens tab, set Lens Distortion to Known Lens. Copy LensDistortion's Radial Distortion 1 and 2 and Distortion Center values to the equivalent CameraTracker fields. Enable Undistort.







11 Solve the camera

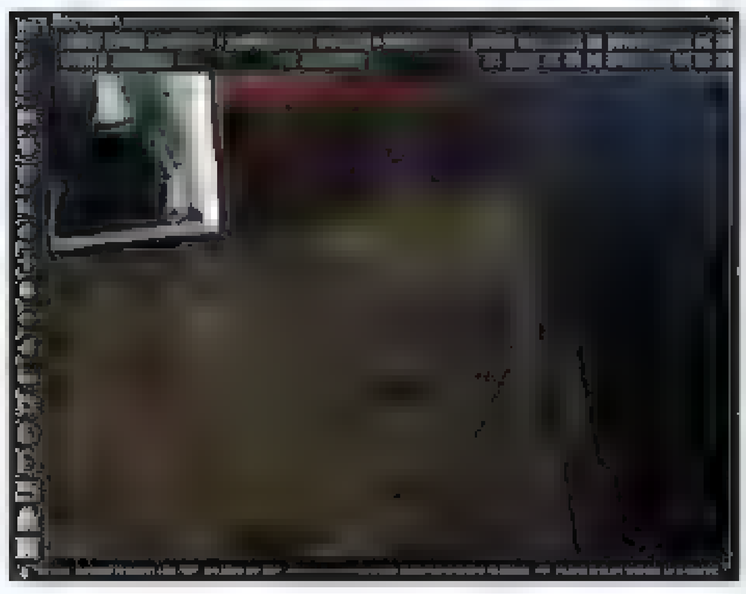
Click Solve Camera to convert the 2D points to 3D points. If you go to the 3D data in the Viewer [Tab], you should see the point cloud. Now it's time to refine and orientate your scene. Rotate around the scene, and try to see if the point cloud looks like the scene of the footage in terms of depth and scale. Can you see what looks like a room and a table?

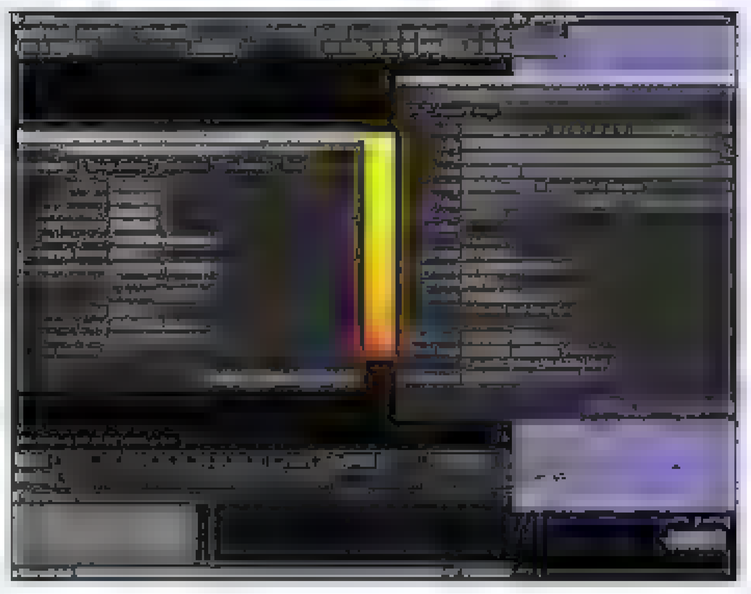
12 Refine the solve

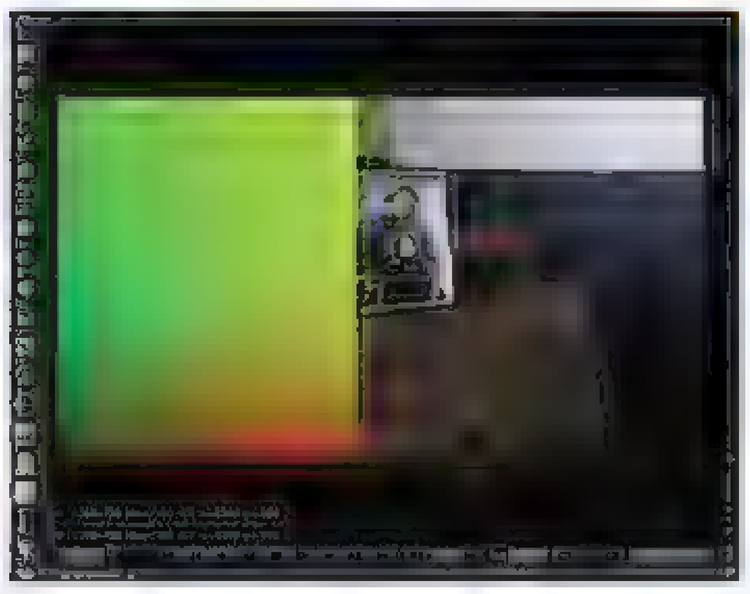
In CameraTracker's Refine tab, you can refine the track and get a better Solve Error figure, shown at the top of the panel. I have 0.8 so far, but if I change the settings in the lower sliders, I can get something better. In the screenshot, you can see the representation of the number of tracks, errors, max error, track len, and so on. (Please see the video for a detailed explanation of each curve.)

13 Work with the solve data

Select both the track len - min and min length curves using [Ctrl]. Move the min length slider to 4. you can see in the curve that this makes the solver ignore any tracks that are less then 4 frames long. If you have the Viewer connected to the CameraTracker node and in 2D, you will see some tracks turn red.







03 Lens distortion values

A few minutes later, you should have a distortion value in the Lens Distort on tab. You can use this node to undistort and re-distort your footage after all the CG and comp work is done. If you press [D] in the node, you can see the plate with and without lens correct on applied. At this stage, you can also render a displacement map out of your Lens Distortion node...

04 Render the lens displacement

Set Output Type to Displacement: this will save the distort map in the motion channel. Use a write node to save the file – make sure you save a 32-bit EXR and select motion in the channels drop-down. You need only render one frame. This method saves a lot of render time and is great if you have a lot of clips filmed with the same camera.

05 Use an STMap node

Using the LensDistort on node can be very slow. An STMap node can apply the same 'undistort' values with less processing power. Read the displacement map file you just rendered, then bring in an STMap node via the Transform button. Pipe the displacement map to the STMap node's stmap input and the footage into its src input. In the STMap node Properties, set UV Channels to motion.







08 Tracking tab

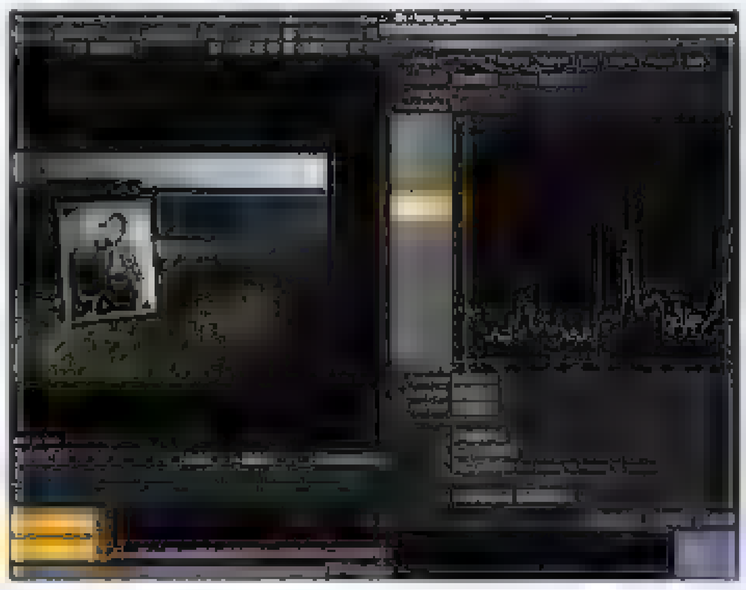
In the Tracking tab, you can change tracker settings and preview the result. Enable Preview Features to see the trackers. This shows you where Nuke will track 2D points to try to solve a 3D camera. Number of Features controls the number of trackers. Simply increasing the value doesn't necessarily give you a better track. Try values out; I settled on 600.

09 Track features

Scrub through the footage and check that you have enough features to get a representation of the room. The trick is to have a good spread of tracks in the most important parts of the footage. Use the Track Threshold and Feature Separation sliders to distribute the tracks more evenly. I set Track Threshold to 0.1 and Feature Separation to 8, but experiment with different values.

10 Tweak the track

Now go to the CameraTracker tab and click Track Features; after a few minutes, you should have the first track done. Scrub the footage to check if the tracks are working. Using [Shift]-select you can select and delete any tracks you think are no good, for example any reflections or false corners with the wall and the chair. Delete points by clicking the right mouse button over a track.







14 Remove the worst errors

Now select error - max, max track error and max error in the graphs. Press [F] to centre. Change max track error to 0.6 and max error to 4.8. This will 'kill' the tracks with the worst errors and make the track cleaner and smoother. If you now click Recalculate Solve Nuke will re-solve, and your Solve Error value should drop below 0.5. That's good: less than half a pixel of error.

15 Select an origin point

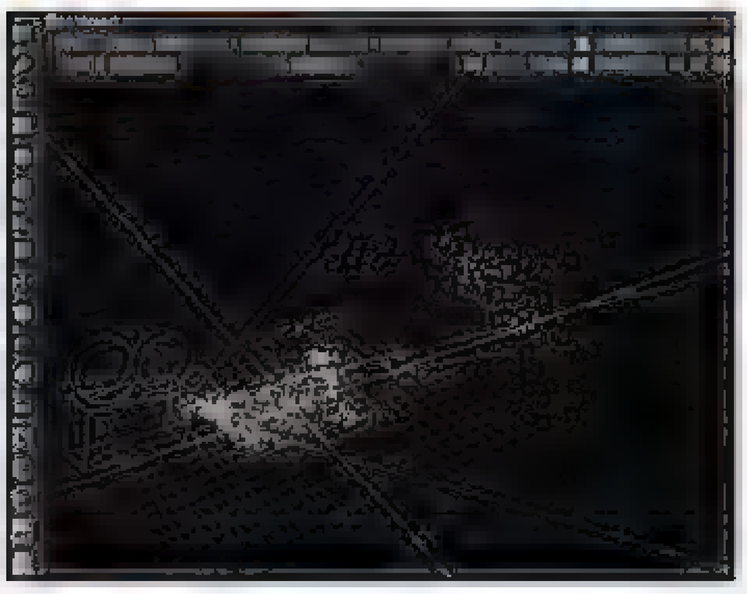
In the Viewer, select a single point in the track that seems to be the origin. The origin should be the 0 coordinate in all axes, so it should be part of your 'floor' of the scene. It should also be a point with a low error value: hover the mouse over a track to read its stats. I selected a point in the lower left corner of the photo frame. Right-click your chosen point and select ground plane > set origin.

16 Orient your scene

Now you can orient your scene, so the tracks in the table go to the actual floor of the 3D scene. Select a bunch of points on the table; switch to 3D, just to make sure the points are all in the same plane. Now right-click and select ground plane > set to selected: they should now be pink. Make sure you don't select the origin point in this step.

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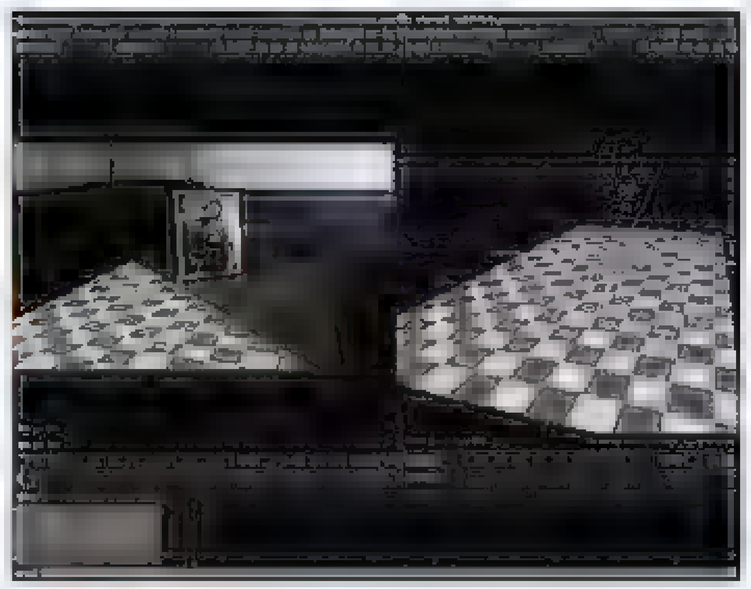
17 Update your solve

Now you have a good track and point cloud, finish by updating your solve with the new orientation. In the Refine tab, select position and rotation and click Refine Output. You are ready to click Create Scene in the CameraTracker tab. This makes a new Camera and 3D Scene in your script. Look in the 3D Scene: you should see the table, the photo frame and the chair as a point cloud.

STAGE THREE

Model the room for projection

With a proper 3D track, you're now ready to match-move geometry within the scene. This geometry will help you place new textures in the tables and walls, and to relight the entire room to some degree. If possible, always try to make the geometry in a modeling application: Nuke's simple geometry tools may not be enough if you have an elaborate room to model, although they're fine for walls or simple backgrounds for matte paintings.



18 Table geometry

Start with the table. Select a few tracks from its top, then right-click and select create > card. This Card should now be in the table's place, but probably needs a few rotation tweaks in X and Y, and possibly some scale tweaks. You can connect the card to Image > CheckerBoard and 3D > ScanlineRender nodes so you can render out a 2D version of the table to compare with the plate.

STAGE FOUR

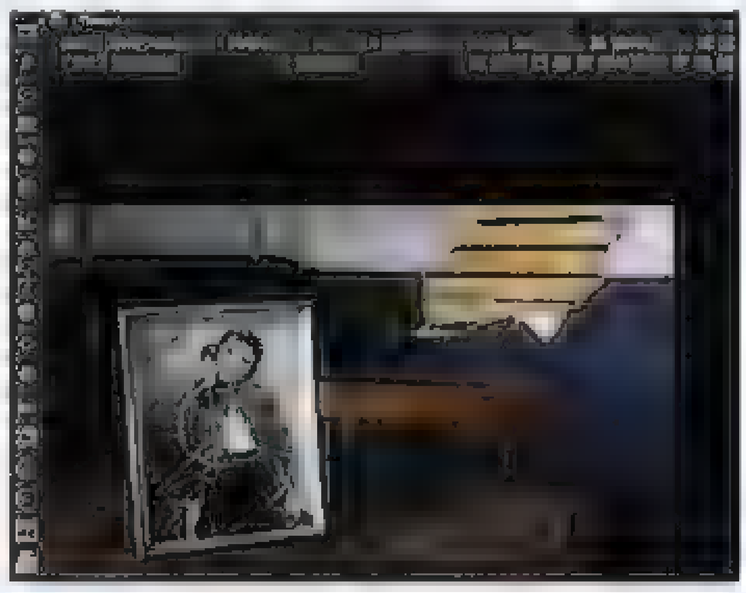
Project textures

Now you have a room, you can start placing some textures in the walls and table. You want to control this layer by layer, so make a ScanlineRender node for each element to merge on top of the footage. Use the same camera for inputting all of the separated scanlines. There's no need to copy the camera: just make a stream with it and keep piping the scanlines into it. This way you can composite all the new elements as if they were CG. Read in glass.psd from bin/textures in this tutorial's scene files. Shuffle the glass_crack layer to RGB, invert it, grade it as you see fit, and premult before connecting into a 3D card.



22 A crack in the glass

From the 3D set-up from stage 3, copy the ScanLineRender, Scene and photo frame card nodes. Use this to manage where your new glass crack card should be in the 3D. The card should be in the same place as the photo frame card, just adjust the scale until you have a believable crack in the frame. Merge the result on top of the undistorted footage. This is your first layer in the comp.



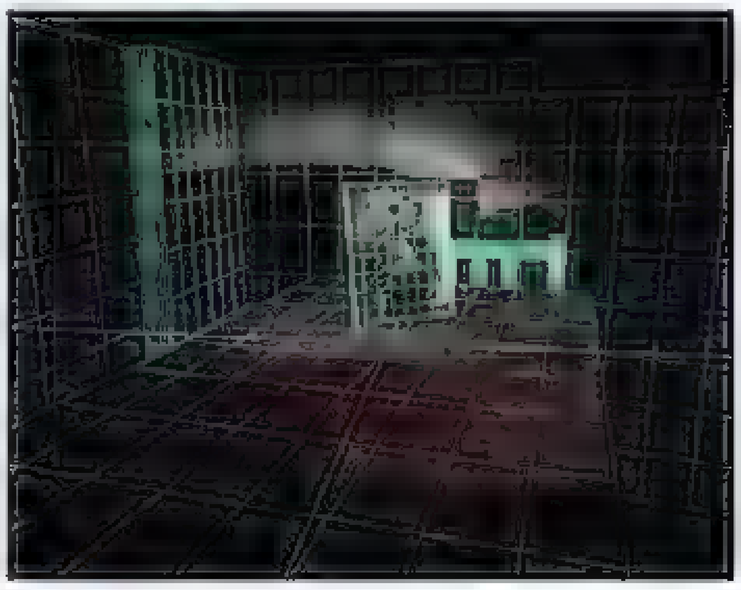
23 A hole in the wall

Read in the wall.psd file, grade it as you see fit and premult it before connecting into a 3D card. From the 3D set-up from stage 3, copy ScanlineRender, Scene and the right-hand wall. Use this to place the wall.psd texture, and adjust the scale until you have a believable crack in the wall. Merge the result on top of the glass merge to establish your second layer.

STAGE FIVE

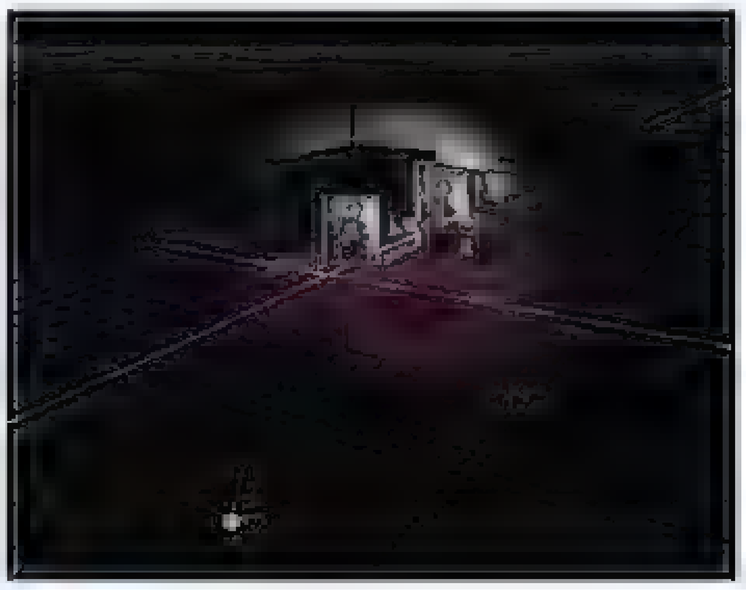
Relighting the room

Since you have a geometry for the room, you can relight the entire footage using Nuke's 3D lights and the new shadow system. Keep in mind that I have not devoted the extra time into making perfect geometry for the room, as I should, because of time constraints. With more time and tweaking, you can recreate a perfect geo for the room. The better this is, the better the quality of the relighting and shadows will be.



27 Project the room

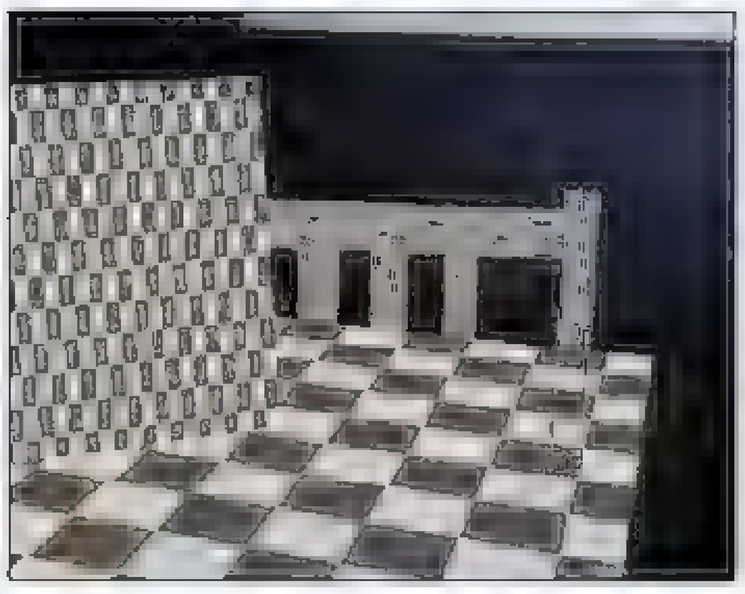
Copy the entire room geometry and 3D set-up from stage 3 and paste it at the end of the script. Use 3D > Shader > Project3D 3D > Shader > Apply Material to project the footage you've comped so far into the room geometry of the room, using the camera from before in the Project3D cam input. With a scanline node and the same camera, output the new room after the projection.

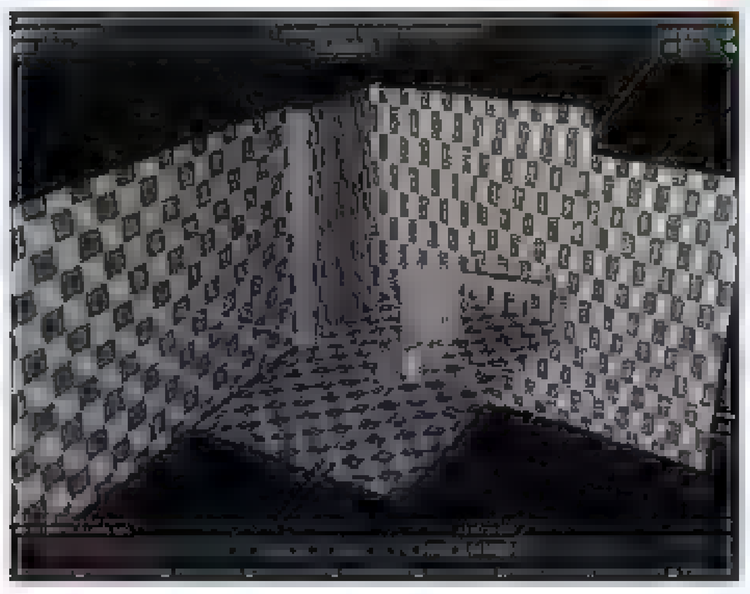


28 Relight in 3D

Select 3D > Lights > Light plug it into the projected Scene node. Set Light Type to Spot and enable Cast Shadows in the Shadows tab. Place the light where you like. I simulate a flashlight effect in the video tutorial, but you are free to relight the scene as you prefer.







19 Photo frame geometry

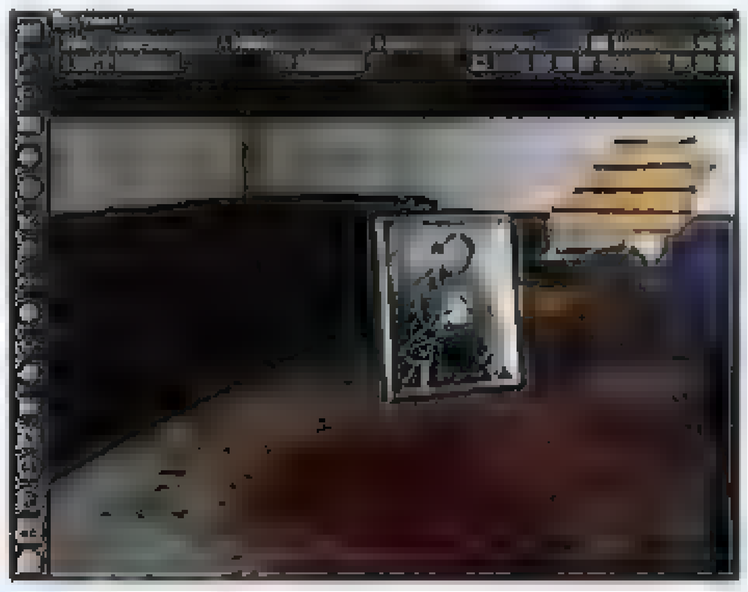
As you did for the table, select some tracks in the photo frame, create a card, and tweak the rotation and scale to fit. You could use a temporary Merge > Merge node to merge the result of your scanline render with the original undistorted footage. This is a good way of checking if your geometry is matching the footage. Always scrub back and forth to check the match in several parts of the footage.

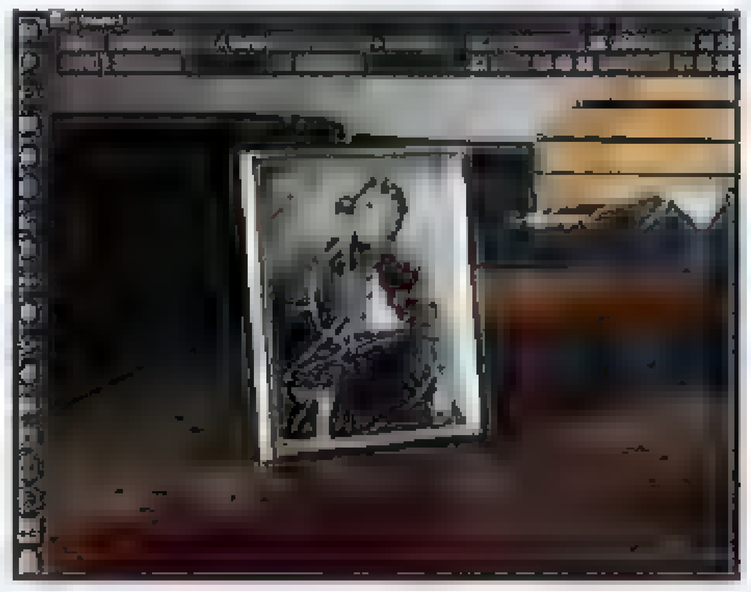
20 Chair geometry

The chair could be tricky. If you have a 3D app, it may be a good idea to use it, but a few cubes in Nuke should do the trick. As before, select some tracks on the chair, but now right-click and select Create > Cubes. Tweak the rotation and scale. Keep doing this until you have one cube per part of the chair, then use 3D > Modify > MergeGeo to merge it with the scene. Check it on top of your footage.

21 Wall geometry

Keep using the same method to recreate the walls. Always check the original plate with a Merge node, and use the CheckerBoard material on the geometry so you can see it in the 2D view. The video shows this process in more detail. The more time you devote to correctly modelling the room, the better all the next steps will be, so don't rush.







24 Blood on the table

Read in blood_01.psd. Shuffle the splatter layer to RGB, grade it, and premult it before connecting into a 3D card. Copy ScanlineRender, Scene and the table card from the 3D set-up: use these to place where your new blood card. Adjust the scale until you have a believable splatter of blood on the table. Merge the result on top of the earlier layers to create your third layer.

25 Blood in the photo frame

To put blood in the photo, you can copy the 3D card you used for the glass crack in step 22. From the blood_01.psd file, shuffle the drops layer to RGB, grade it, and premult it before connecting into a 3D card. Adjust the scale and rotation until you have a believable blood splash in the photo. Merge the result on top of the earlier layers for your fourth layer.

26 Extra blood

If you want more blood in the scene, feel free to use more of the layers of the psd file – or get your own blood splatters, extra dirt or anything you would like. With the geometry of this room, the possibilities are great. The video offers a more detailed explanation of how to add some extra blood to the chair and wall and to place some extra dirt on the table and walls.



29 Final tweaks

With all layers comped, take some time to finesse the final render's quality in the 3D system using the sampling options. See the video for a detailed explanation.

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3D WORLD

Check out Anthony Ward's tips on low-poly modelling for Maya

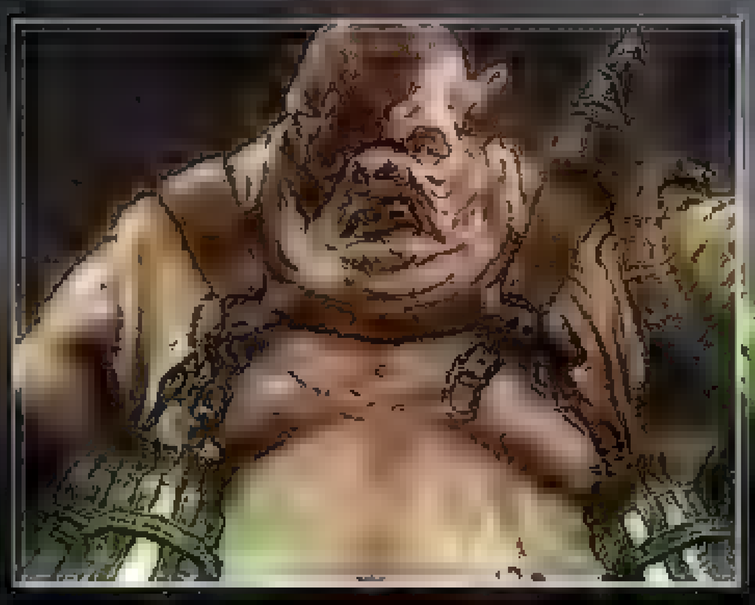
Next Issue

HIGH DYNAMIC RANGE

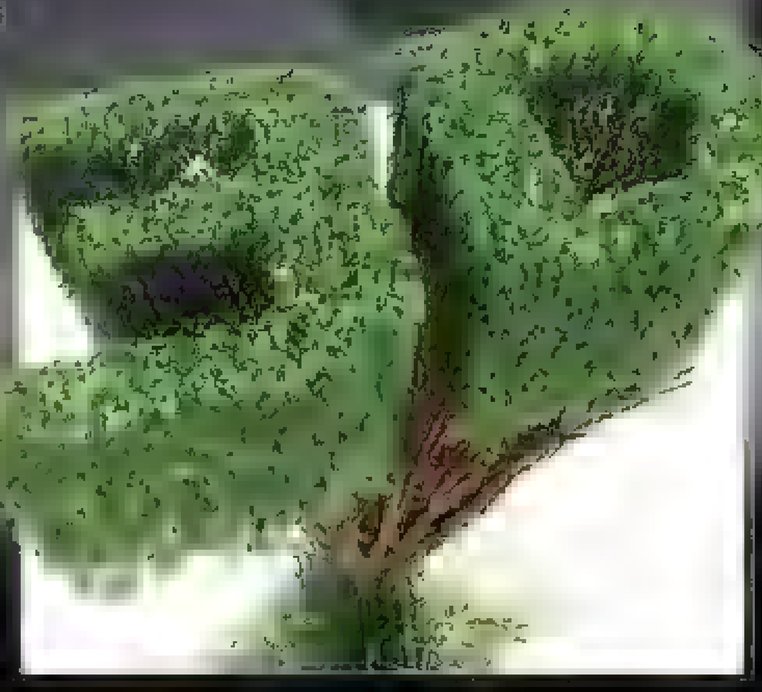
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Character animation tool

PRICE

PLATFORM

MAIN FEATURES

- Import 3D geometry
- Character rigging
- Motion capture and animation
- Camera modifier
- Collision detection
- Plug-ins for 3ds Max and Cinema 4D

DEVELOPER

WEBSITE



an(i)ma

This new scene population tool could transform working practices in arch-viz and other fields, says Jason Kongabel

The call rings out across the studio as heads turn to attention: "I need people. Animated people." A hush falls: no-one dares make a sound in case they become the unlucky one given this dubious task. "By tomorrow morning!" Cell phones come out, calls are made and texts are sent... "Honey, it's going to be another all-nighter." The sweet smell of energy drinks begins filling the air. It's going to be one of those nights.

This is now a problem of the past. Enter an(i)ma by aXYZ design, the software all of us have been waiting for since we placed our first people in 3D space. This stand-alone software is capable of quickly creating complex character animations in a fraction of the time of other solutions. New software can be a daunting task to learn, but trying to figure it out without reading the instructions is something I always try to do. This doesn't mean that I expect to figure out every nuance of the software, but can I get in and play around and create something interesting? The answer with an(i)ma is a resounding yes.



I created a simple wavy road with kerbs in 3ds Max and exported it as an OBJ. Once imported into an(i)ma, I had two dozen or so 'actors' walking back and forth along my road in less than five minutes, politely moving out of the way when getting too close to one another.

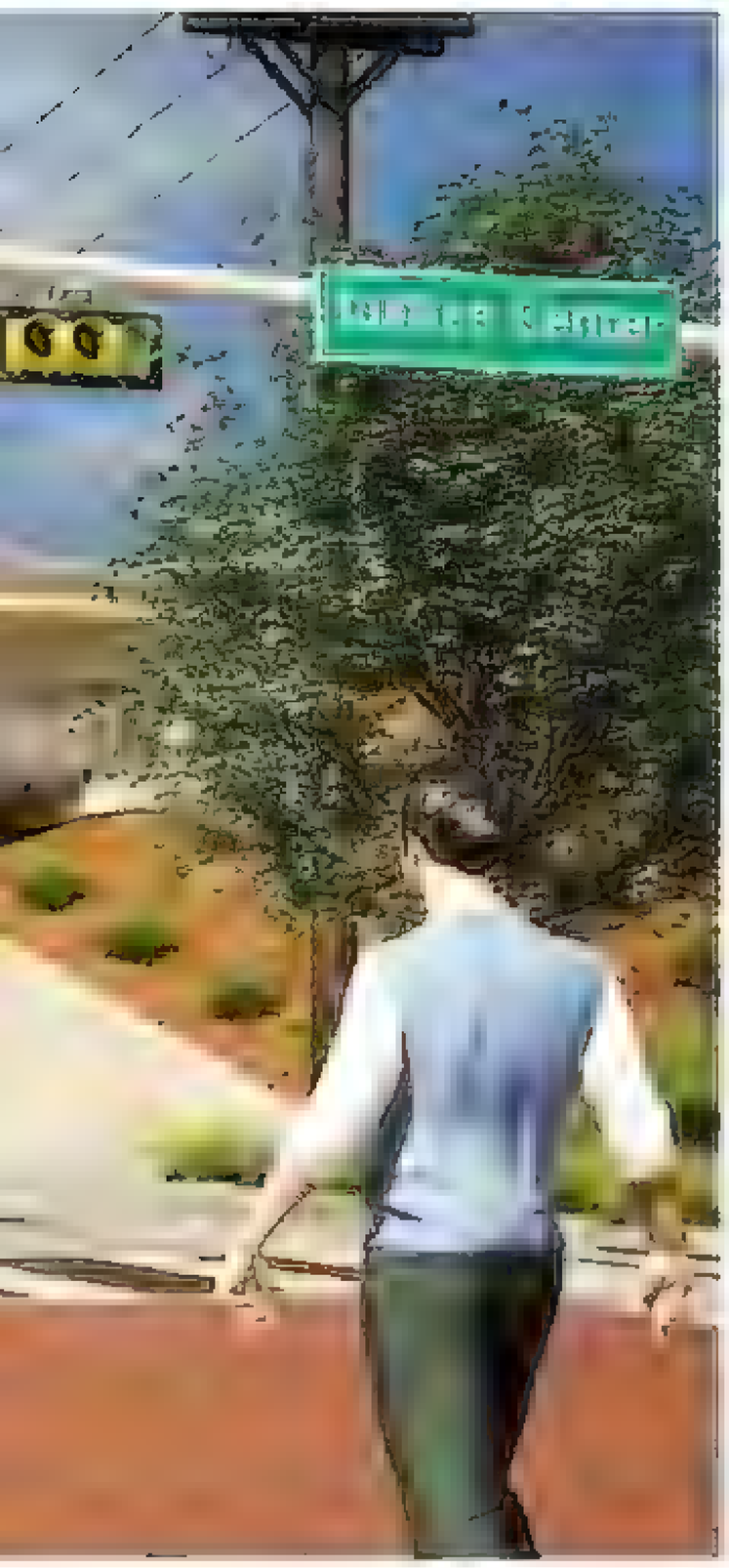
What this means in the real world is that any artist, no matter how new and untrained, can generate in hours or even minutes what would have taken multiple artists weeks to accomplish using previous methods. This feat alone is a success in



Jo [illegible] is a partner of Dallas-based Mo[illegible] and specializes in architectural design and visualisation projects

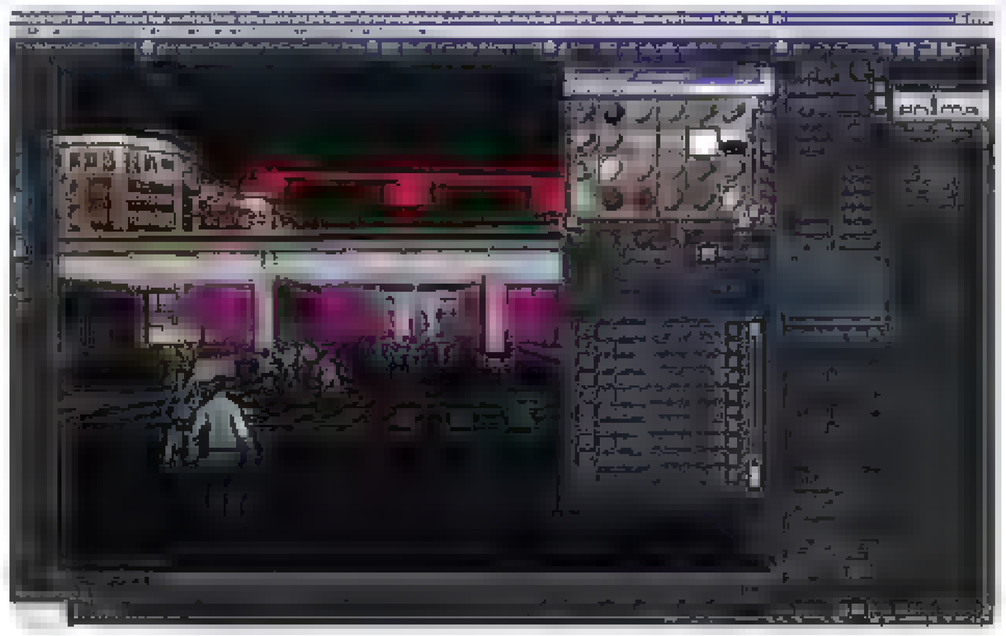
Setting up stair paths is relatively easy and intuitive: simply click on the first step and the last, and you're done

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an(i)ma is able to handle massive amounts of people, but be prepared for long load times and memory shortages. Plenty of RAM is a must if you plan on attempting large crowds



my eyes and makes the software worthy of purchase. However, like most version 1.0 software, the program is not without its bugs. In the first hour of using the software, I encountered four crashes, so save often and read those instructions.

KEY FEATURES

Files can be imported as .3ds, .obj, or .fbx, but are not editable once imported. However, using the Layer List, parts of the imported geometry can be turned on or off to make adding paths to multiple levels easier. Only surfaces such as floors, stairs, ramps and escalators must be imported, but other geometry can be helpful to mark the limits of the project.

The creation of character animation paths is split into four methods: spline, fixed, stairs and escalator. All four are fairly simple to use, but can be combined together to create complex animations.

Once paths are created, adding people is as simple as selecting what actors from the library will be animated on that path. Using the Cloner modifier allows for multiple instances of the selected actors to be randomly placed along paths and gives the ability to modify their placement and speed in real time.

When a path is complete and the actors are animated, the next step is to have the software compute the character paths and look for collisions. If collisions are found, the software automatically adjusts the path of the two actors to keep them from running into one another. This path adjustment is hardly noticeable on small-scale simulations, but when the actors become crowded, the effect is quite distracting with characters doing more avoiding than walking. This can be improved by decreasing the number of clones or increasing the offset of the characters on their paths.

Once all the people are moving about and looking busy, time to import into either 3ds Max or Cinema 4D. For this review I used 3ds Max, but the import process should be the same for both. After installing the provided plug-in, all that's required is to import the saved .ani file and wait. The plug-in recognises which rendering engine is currently in use (V-Ray and mental ray only), and generates materials based on that rendering software. Once the import is complete, additional options are available to change the RGB level of the textures, display mesh properties and apply motion blur.

ARCH-VIZ LANDMARK

This product is a milestone in the architectural visualisation world. It's easy to use, fairly stable, and the end product is like nothing I have ever been able to accomplish using standard techniques. It's possible, and the results might look as good – but I couldn't even begin to estimate how much time it would take.

Having said that, like most character animations, the effect is best viewed from a distance, with motion blur and depth of field. The library of characters is fairly limited – just 20 on release – and there is no ethnic diversity in the collection. The range of motion is also limited to walking, but there are several overlay clips that can be applied so that all the characters aren't walking the same way.

Whether you're in a small or large studio, this software is a must and requires a shallow learning curve. The hours of production it will save on the first use should more than cover the cost of the premium version, not to mention the 'oohs' and 'aahs' it will surely elicit from clients.

The UI inside 3ds Max makes updating settings easy. Each actor has a colour material palette, enabling changes in cloned assets

3D VERDICT

PROS

- [illegible]
- [illegible]
- [illegible] investment quickly

PROS

- [illegible]
- [illegible]
- [illegible]

Reasonably priced, time-saving software for any studio that uses 3D people

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Clothing generator

PRICE

- [illegible]
- [illegible]

Enterprise

- [illegible]

PLATFORM

[illegible]

MAIN FEATURES

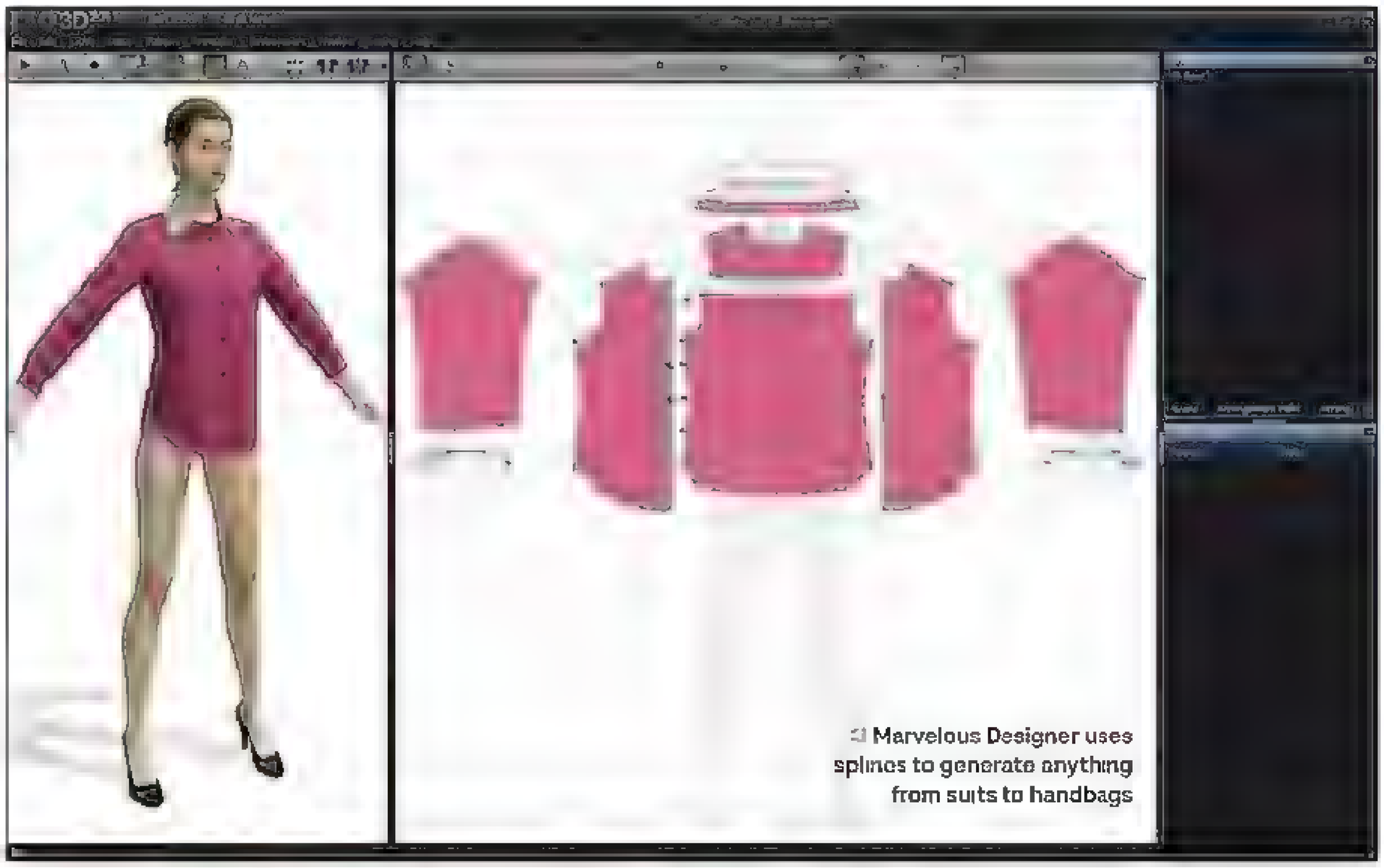
- Digital pattern design and sewing
- [illegible]
- [illegible]

DEVELOPER

CLO Virtual Fashion

WEBSITE

marvelousdesigner.com



Marvelous Designer uses splines to generate anything from suits to handbags

Marvelous Designer 2.0

Is this CAD-based clothing generator really as Marvelous as its name implies? Cirstyn Bech-Yagher finds out

The idea behind Marvelous Designer is to provide easy digital fashion for the masses. Established in 2010 and counting as one of its core members the initial cloth simulation researcher and core algorithm developer, the development team has created a stand-alone CAD clothing generator, enabling you to create clothing based on your own or commercial sewing patterns. Initially catering to hobbyists and content providers for the ready-to-render 3D segment, such as content creators for Poser, DAZ Studio and Second Life, Marvelous Designer has also generated interest among more mainstream modellers and animation studios.

At first glance, Marvelous Designer 2 seems fairly similar to 3ds Max's Cloth Solver in functionality, and easier to use than the closest competition in its segment, OptiTex, which generates dynamic clothing for DAZ Studio and Poser. You draw a pattern via splines, hook up its seams, define pleats, darts or folds, and run the wrapping simulation.

Marvelous Designer sports a simple interface. A real-time simulation view on the left contains your working avatar – native or imported – and its customisable arrangement points, a gizmo for tweaking, and the cloth simulation toolbar on top. To the right is the pattern design view, with an avatar outline, a grid and the spline and cloth tools on top and the right. In addition, there's a simple animation editor for animating and rendering the avatar wearing the simulation.

MARVELOUS WORKFLOW

The standout features in Marvelous Designer are the pattern designer and draping tools. The pattern window, despite its lack of direct pattern import capabilities (the workaround is to import onto a rectangle and apply it as a texture), is simple to use, and demands no prior knowledge of sewing pattern generation, although a basic working knowledge of how clothes are put together helps.

The workflow is as so simple: you can import any figure – though preferably an A-pose biped in OBJ format – and draw your pattern of pretty much any clothing item, including caped or hooded items, via the spline tools. You can also define seams, darts, pleats, folds or wraps. After the initial drape and render, pattern changes and tweaks get updated in real time. When you're done with your piece of clothing, you pose your object file and import as a pose – the clothing will then drape itself around the posed mesh.

One of the nicer touches in Marvelous Designer 2 is the use of shortcut keys. Pressing [Q] enables you to manually drape and tweak your clothing item until it lies the way you want to: handy for anything from making a T-shirt's folds lie just so to making lapels on a jacket lie down or positioning a hood. Combined with the [W] key for pinning, this shortcut enables fast



The ability to manually tweak or pin a fold makes it easy to make clothing lie just right on your mesh



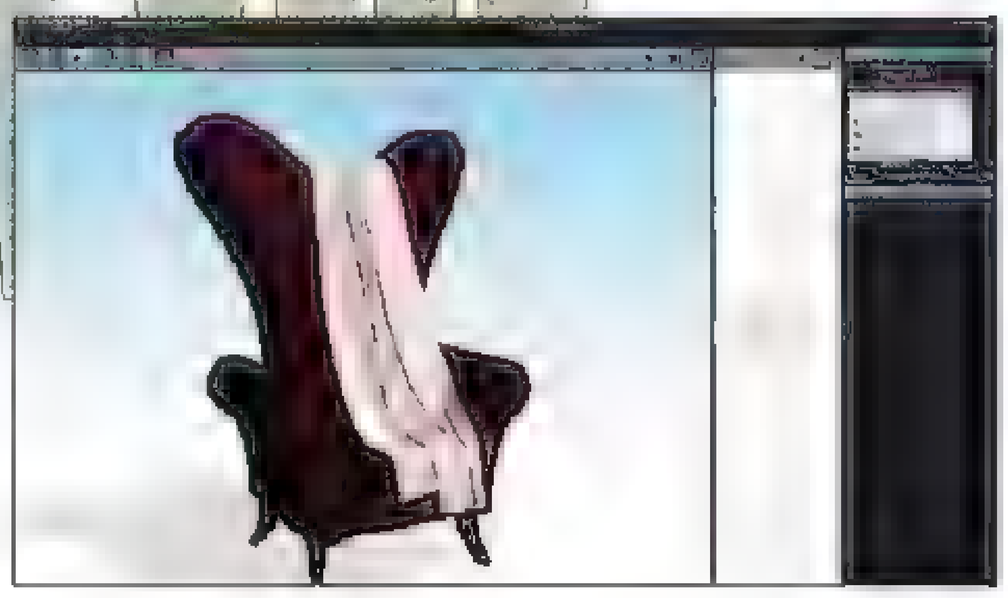
Cirstyn Bech-Yagher has a long history of developing plug-ins for clothing and hair, ranging from hair and clothing tools for Poser to morphing, rigging and texturing [illegible]



Marvelous Designer outputs the UV map according to the sewing pattern you've defined. But it won't output quad meshes until a later update is completed



A simple animation editor allows for animating the output into presentations



Marvelous Designer will happily drape anything it can around whatever it can import

creation of accessories like knotted ties, scarves or belts.

All generated items can be used on different meshes and genders, thanks to arrangement points – custom collision points for a specific mesh that define how to drape the clothing pattern around the mesh. Generated clothes can also be layered via the merge cloth command, allowing for flexible mixing and matching.

GROWING PAINS

With a name like Marvelous Designer, however, the question needs to be asked: is it really Marvelous? In a few releases' time, that prospect seems likely. Like most software in its infancy, Marvelous Designer still has a way to go, though – especially when it comes to facilitating content provision. A simple facility like a named object function or retaining object names when re-exporting imported objects would have been good. As it is, you often run the risk of having to navigate your way through a tree of materials all named Material# and number – even on specifically named meshes like the DAZ Millennium figures when you export your dressed biped.

In addition, importing a mesh from Poser or DAZ Studio works fine, but you can't drape or pose a DAZ Studio-exported figure's clothing on a Poser-based figure or vice versa, even though they share the same geometry. Poser's figure will import at a larger size, and demands different application points. If you're a content provider, your safest bet may be to drape your clothing in a T-shape of the base geometry, and hold off posing clothes in Marvelous Designer for morphs.

There will be no quad output of draped clothes until the April 2011 beta, which is another issue when creating cross-application conforming content: neither Poser nor DAZ Studio is too keen on triangulated meshes. You can rig them in the Cloth Room or use DAZ Studio's rigging tools, but the way the base meshes are cut to facilitate posing and animation favours quads. Nor does Marvelous Designer have a specific morph support function other than object import, although it's slated for a future release. A symmetry function in the pattern view would have been good, too: you currently only have a mirror/copy function. Further, a vector import function for patterns, guides and snaps, a larger spline toolset, more right-click options and mesh import tweaks, such as retaining group names other than 'mesh', would have been useful.

There's also the issue of price, which is unavoidable if digital clothing providers are part of your intended market. In the current financial climate, and with brokers taking fees prior to taxes, it's unlikely that many content providers with an already existing pipeline will be willing to pay $700 for the sole privilege of being able to sell meshes generated in Marvelous Designer 2.0, no matter how beautiful the clothes are (and they are beautiful). The toolset is not yet geared towards content production – a different kettle of fish to mesh production. The $500 difference between a personal and a commercial licence, with no added functionality other than permission to sell the generated mesh, may be overly optimistic.

These issues aside, Marvelous Designer is worth having in your toolkit – once the quad patch arrives and a slotted morph functionality is implemented. It's easier, faster and cheaper than Opt Tex, and has more functionality than some of the toolkits in the bigger modelers. And last, but not least, it's fun to use.

"Marvelous Designer has more functionality than some of the toolkits in the bigger modellers – and it's fun to use"

3D VERDICT

PROS

- Fast clothes generation
- Excellent output
- Low learning curve

CONS

- Triangulated output only
- No morph generation support
- Could use a bigger spline toolset

Despite its steep price, Marvelous Designer is an easy way to generate clothes based on sewing patterns

This CAD-based cloth and draping generator could create a virtual e-fashion mall and market for the ready-to-render demographic



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After Effects plug-in



A simple greyscale image was applied to FreeForm on a solid, and a light added. This could be spherised to make a 3D globe

Just part of FreeForm Pro's arsenal, Generator enables you to create stylish – and animatible – abstract art in a few clicks

PRICE

[illegible]

- 183 / $299 / €2[illegible]

PLATFORM

Windows (Mac to fo[illegible]

MAIN FEATURES

- 3D warping
- D[illegible]

DEVELOPER

Met[illegible]

WEBSITE

mett.e.com

FreeForm Pro

Building on a plug-in included with After Effects, this tool provides mighty motion graphics tools, says **Rob Redman**

There will be many times in the career of a 3D artist when you need to add displacement effects to an image, footage or other asset. When this happens, it's all too easy to get wrapped up in opening your favourite 3D app and waste valuable hours tinkering, when you could be so much more efficient if you used something like FreeForm Pro to do the heavy lifting for you.

This plug-in for After Effects CS5 – Windows only right now, although the developer says a Mac version is under way – has a couple of main toolsets. First is the ability to warp a chosen layer or comp using a mesh or grid. You define the number of rows and columns the layer is divided into, then freely move the vertices to warp the underlying image. This has its uses, but it doesn't hugely improve on the built-in tools supplied by Adobe.

Where FreeForm Pro becomes more interesting is when you start to approach the displacement tools. You can create a displacement map just like you would for any other 3D app – but watch out: FreeForm uses 100% black as its zero height, rather than the normal 50% grey. The resulting map can be applied to any layer or comp and is a fast way to stamp detail into a surface or to animate some crawly creature lurking under an actor's skin, for example. By adding some lights and a camera, it's a fairly simple job to match the displacement to the footage, and realistic results are easily achievable.

FreeForm Pro relies on the power of the GPU to accelerate performance, but it will take a modern, high-powered card to let you really explore the tools in a usable way. If you've ever tried FreeForm AE (bundled with After Effects CS5) and turned on anti-aliasing, you may well be familiar with screen refresh nightmares on some machines. The Pro version lets your CPU take a back seat while your graphics card takes the load. My 1.3GB Quadro 2000 was mostly lag-free for setting up, but I did notice some slow-down when I approached final render settings, using a denser mesh and medium AA levels. However, I did have 700 subdivisions in a 1080p comp for this test – so all in all, I'm pretty impressed. If I could see displacement previews of that quality in my 3D app, I would be over the moon.

FreeForm Pro offers a few more tools than its CS5-bundled stablemate. But more importantly, it offers a big performance improvement – if you have the workstation configuration for it to take advantage of.



FreeForm Pro's controls are set out in a simple, intuitive hierarchy that will be familiar to all After Effects users

3D [illegible]

PROS

- [illegible]
- T[illegible]ff the CPU
- [illegible]
- M[illegible] than the AE [illegible]
- [illegible]

CONS

- [illegible]
- [illegible]

A useful set of tools for displacing layers in After Effects, but one for users at the bleeding edge. If you don't have a 1GB graphics card, you may be better off sticking with the AE version.

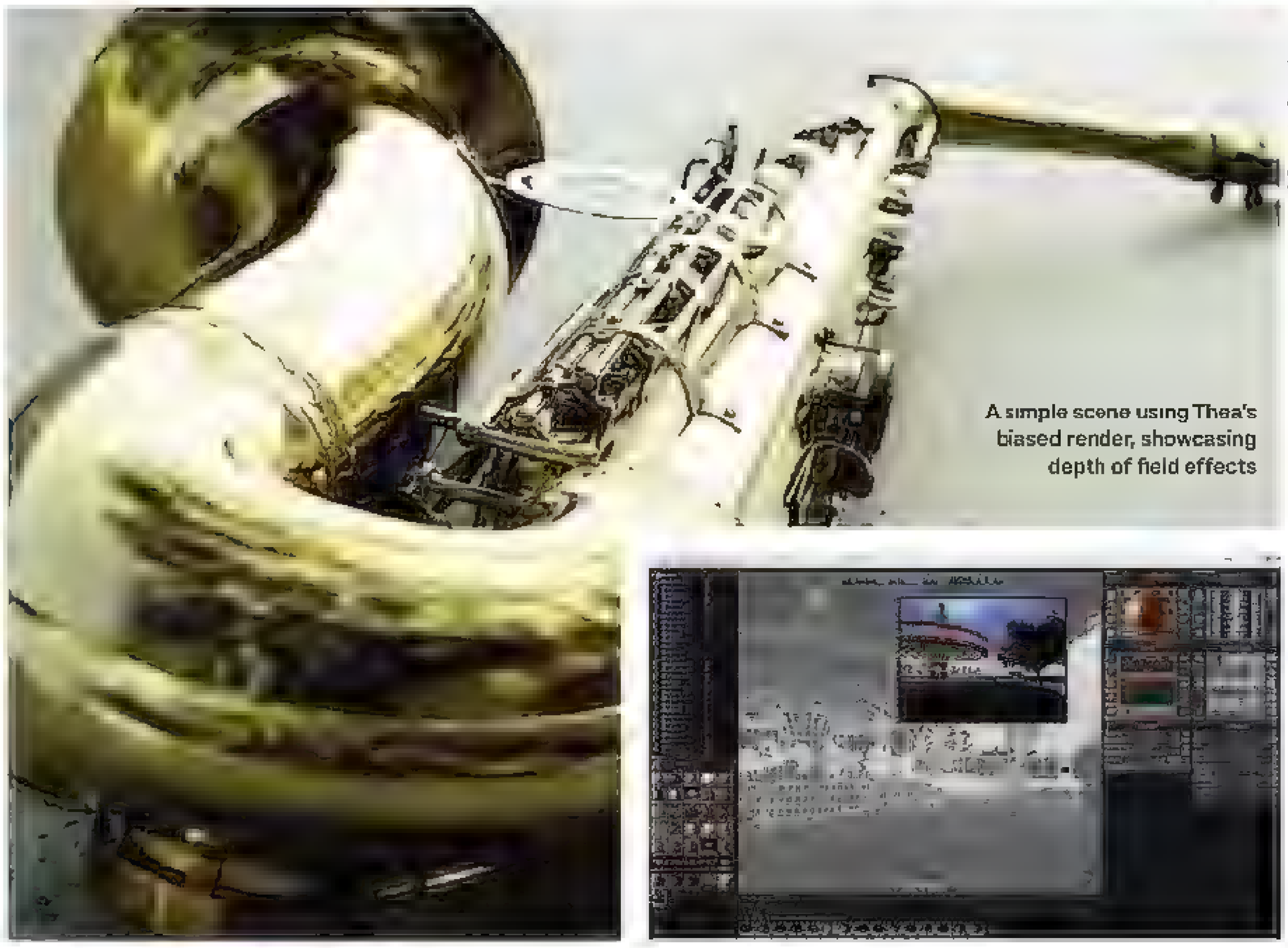


Rob Redman is a [illegible] Worldwide freelance editor. [illegible] plug-in more than a [illegible] day working on [illegible] effects, [illegible] he's also a Games Workshop [illegible] and has his own training DVDs

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Rendering engine



© Image by Peter Stoppel

A simple scene using Thea's biased render, showcasing depth of field effects

A fairly new addition to Thea builds, the interactive preview render works quickly and is superb for quickly adjusting lights and materials

PRICE

- [illegible]
- [illegible]
- [illegible]
  3D [illegible]
- €[illegible]
  depending on app

PLATFORM

[illegible] Mac / Linux

MAIN FEATURES

- [illegible]
- [illegible]
- Interactive engine for [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
- [illegible]
  and Softimage

DEVELOPER

Solid Iris Technologies

WEBSITE

thearender[illegible]

Thea Render

Its support for both biased and unbiased rendering is just one of this new system's many delights, says Ed Ricketts

Unbiased rendering engines have caught on in the last few years, and are developing rapidly. With relatively mature unbiased engines such as Maxwell Render available, what can newcomer Thea Render offer?

A great deal, as it turns out. It's the first commercial solution to offer biased and unbiased rendering in one package. Use biased rendering when speed is important, or for animations, then switch to unbiased for greater realism. Both approaches use the same materials and lights: there's no need to convert a scene should you want to flip between biased and unbiased.

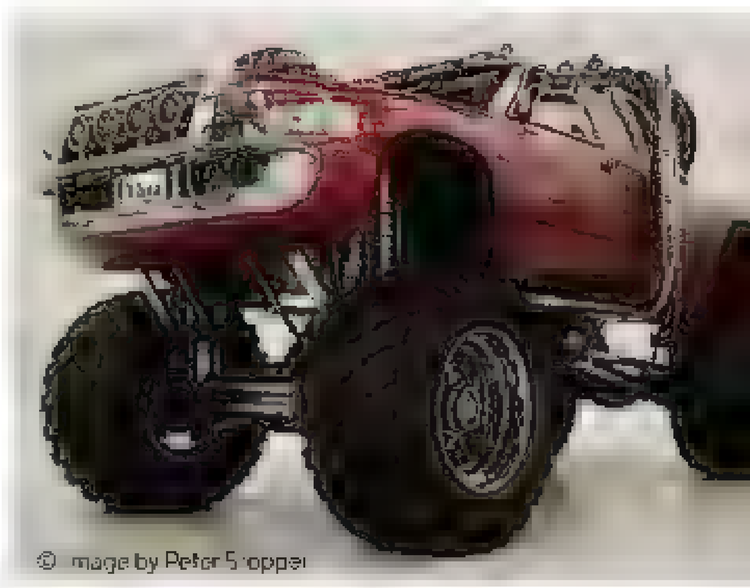
Thea actually has three render methods. The biased engine has ray tracing, GI and photon mapping, with optional final gathering, caustics and an irradiance cache, much the same as V-Ray or mental ray. The two unbiased engines are tuned for different render speed requirements. There's really not much to do otherwise: just specify a time limit or number of passes, and start rendering.

Biased rendering, however, has a whole wodge of parameters; as with any GI tool, there's a lot to consider, and time spent test rendering could easily be saved by going unbiased from the off. To counter this, Thea sports a wonderful interactive renderer that updates on the fly as you adjust lights and materials.

Thea's materials are key to making any scene appear realistic. There are just five discrete material types, but these can be mixed. If you're used to more conventional renderers, creating materials can be confusing at first: it's best approached by breaking down a material's real-world properties rather than 'what looks nicest'.

Any render engine lives or dies by its output quality and speed, and here Thea shines. Providing meaningful comparisons between rival render engine times is almost impossible given that they all use different algorithms, but in our subjective experience, it's impressively fast. Image quality has improved substantially since pre-release versions, and features such as on-the-fly relighting and Camera Response Function are welcome additions.

There are downsides, of course: the biggest is Thea's interface, which might kindly be described as quirky. The manual is missing new features, and Thea is crying out for some well-written tutorials. None of this should put you off investigating Thea if you're looking for a fast, fully featured renderer. And with plans for major additions such as GPU acceleration, there's plenty to look forward to.



© Image by Peter Stoppel

A studio shot of a monster truck, rendered with the biased engine by Thea maestro Peter Stoppel



Ed Ricketts is [illegible] web-enabled 3D [illegible] and [illegible] 3D [illegible] spends far too much time playing about with GI set-ups for [illegible] own good

3D VERDICT

PROS

- [illegible]
- [illegible]
- [illegible]

CONS

- Initially confusing UI
- P[illegible]ation

Kerkythea's commercial successor is already accomplished, and looks set to become even better this year. Give it a go

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3D World

Post Production

Key moments in CG history revisited



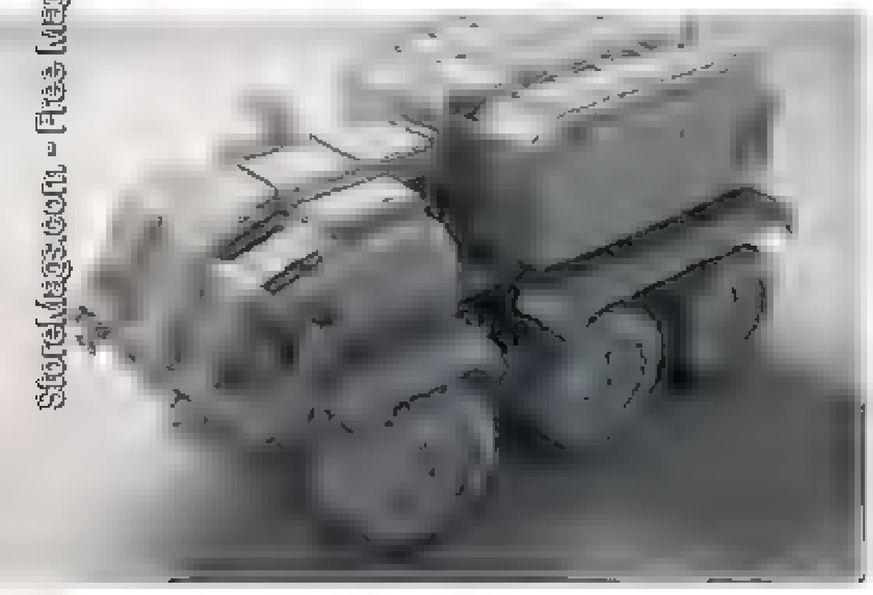
Darkside's dialogue with Kudos led to one of the most technically ambitious UK TV series of recent years: Outcasts

Debrief
Studios look back on the highs and lows of recent commercial jobs

Casting the stones

Andy Bishop of Darkside Animation reveals the highlights and lowlights of creating the VFX for the BBC prime-time drama Outcasts

VITAL STATISTICS
Studio: Darkside
Format: 1080i
Client: Kudos
Project length: April 2010 – Feb 2011 with main production work starting in September
Team size: 16 artists (at the most
Leads: Bruce Sutherland (animation), Sergio Caires (shading and lighting)
Software used: LightWave, Softimage, messiahStudio
Release date: February 2011



A test model that helped Darkside win the VFX contract on Outcasts. Ironically, there are no vehicles on Carpathia



About the author
Andy Bishop is the founder and MD of Darkside Animation, producers of visual effects for TV commercials and feature films. www.darkside-animation.com

n early 2009 Darkside sales director Stuart Wright established a working relationship with one of the UK's most successful drama production companies of the last few years. Kudos (the firm behind the BBC TV series Life on Mars, Ashes to Ashes, Hustle and others) was shooting season eight of Spooks at the time, and an opportunity arose for VFX in two episodes. Darkside was subsequently commissioned to produce these major VFX sequences (episode six's gasworks explosion and episode eight's massive hotel explosion sequence).

Around the end of 2009, discussions were ongoing between Kudos and Darkside about a major new science-fiction project, again for the BBC, called Outcasts. Darkside was commissioned in early 2010 to exclusively produce all the VFX for the show. The production would be shot in South Africa and have approximately 300 VFX shots spread over eight one-hour episodes, which were broadcast on BBC One and BBC One HD in early 2011.

Design discussions with Kudos and its art department commenced soon after we had signed contracts and been formally appointed.

What we did right

1. Targeting prime production companies
Our sales director Stuart Wright introduced Darkside to a good number of industry leading companies, including Kudos. Until Outcasts, Kudos had concentrated most of its output on drama based programmes, with very little use of CGI. Our objective in the earliest stages was to help demystify the VFX process for Kudos's producers and directors, in order to instill a healthy level of confidence in CGI for its productions.

2. Sending a VFX supervisor to the shoot
In April 2010, Darkside asked VFX supervisor Alan Marques and VFX assistant Linda Marques to South Africa to join the Outcasts crew and work on the live-action sequences for the four months of principal photography, and to supervise and gather all data relating to VFX for the show.

While shooting continued, work at Darkside in London started on the design and construction of all the main assets required for the show. The planet Carpathia's first settlement, Forthaven, was the most complex model. It was based on the set on location

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One of the climactic shots from Outcasts. This was one of the densest scenes rendered for the project, with in excess of seven million polygons and more than 300 high-resolution texture maps

CT-9 orbiting Carpathia prior to attempting re-entry. The lens flares reproduce those created by anamorphic lenses on the cameras in the live-action shoot

in South Africa and closely followed the massive amounts of reference material sent by Alan. Test imagery was sent to and from South Africa, where Alan worked on the spot with producer Radford Neville and first block director Bharat Nalluri to make adjustments and changes to the layouts and designs.

Without the constant communication between South Africa and London, this would have been a more long winded process. The fluid nature of this process continued through to June 2010, when Bharat returned to the UK to finalise the digital assets.

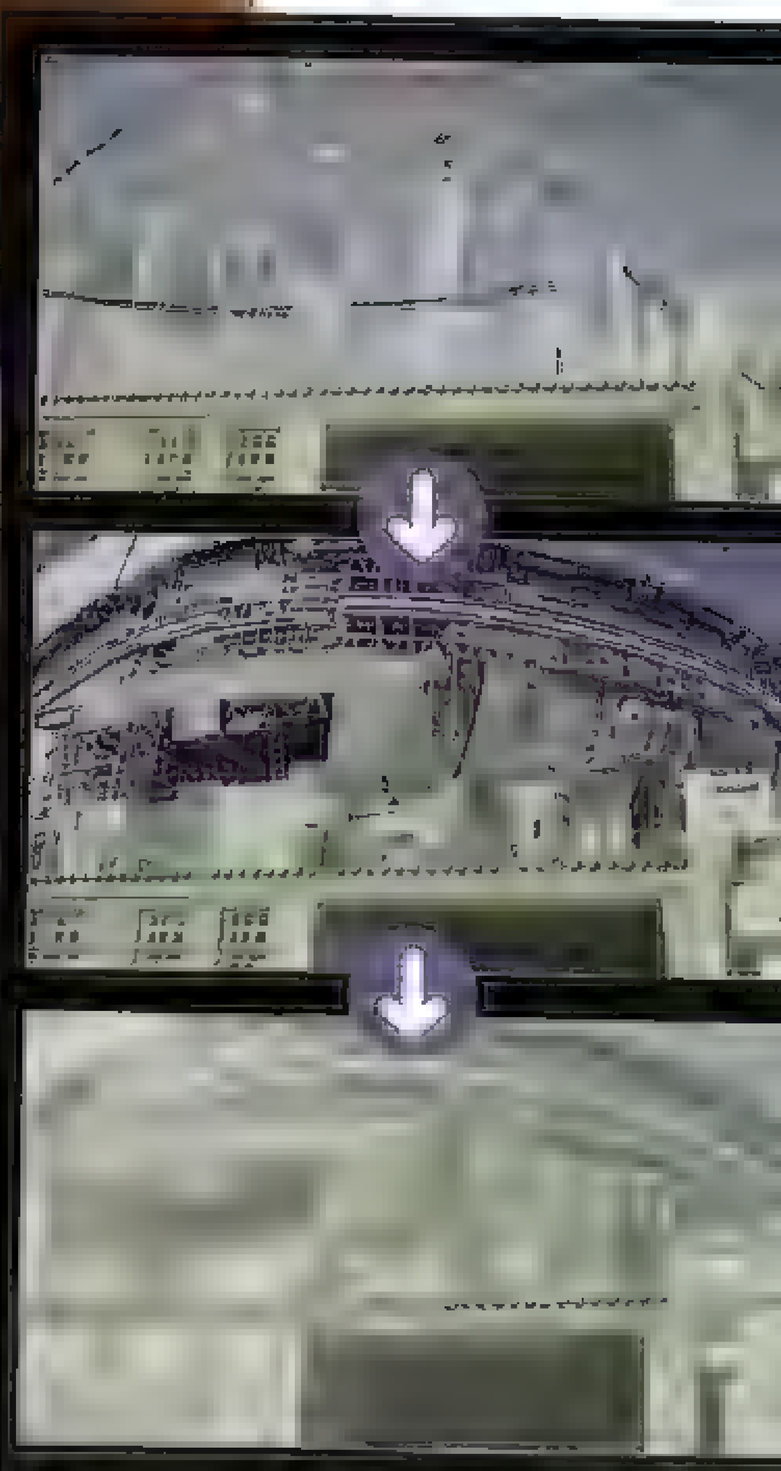
3. End-to-end workflow

Without a doubt, one of the best decisions we made was to invest the time to work up a robust end to end colour management and data handling workflow with post house The Farm in Soho. It paid enormous dividends with the sheer amount of data being run through the systems in both locations. Each episode had a VFX 'spreadsheet of truth', which was the bible to everything relevant to the shots, including descriptions, durations, notes and feedback.

What we did wrong

1. Spending too much time on finals that weren't

The number of shots growing and the amendments made to each shot to suit the changes in editorial proved to be one of the biggest challenges, certainly in the early days of the project, while Carpathia was still being created. Early on in the life of an asset or

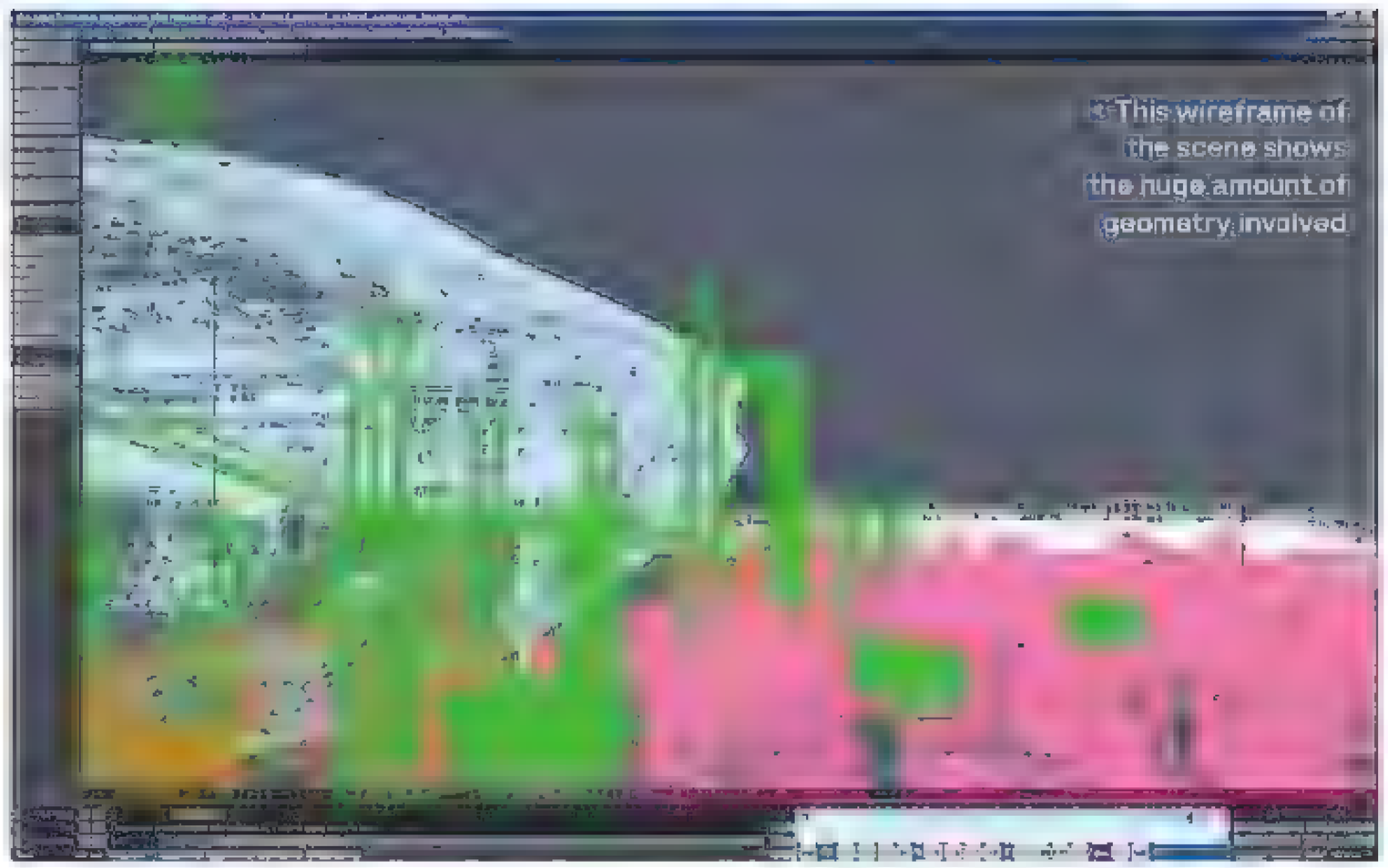


Meticulous planning and data management helped Darkside successfully combine location and CG elements

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Episode three features a huge whiteout hitting Forthaven. Here we see the cloud approaching in the distance



This wireframe of the scene shows the huge amount of geometry involved

shot, less is most definitely more. Getting the pre-viz right and growing step by step from there is always the way to go.

2. Not enough opportunity for minutiae
One of the things we all would have liked to improve was the amount of detail in the Forthaven shots, making them look even more alive and lived-in by adding people, but with the pressures of the ramping production, it was a step too far. In early pre production, we did actualy construct several fuLy textured meshes from reference imagery of extras, but this was wasted time: they never got used

3. Volumetric render times
LightWave was a real boon for the animation of the particles for the whiteout sequences, but render times were horrendous We could hit render times of 30 hours for a single 1,920 x 1,080 frame. This wasn't really a problem when the smoke was far away — maybe an hour per frame — but when the smoke rolled over the camera, the render times shot up.

Lessons learned

Obviously you want to make the best visuals you possibly can for the show, but you can only do this with time invested in proper planning. Making the correct critical assumptions about a project and its parameters at the outset allows everyone to understand the rules and expectations.

You need great staff. Better to have half the people who want to do the job than double who don't. Having Mark Dodwell and Simon Percy on hand meant that this project was much easier than it would have been without them We work very long hours. If the job isn't fun, why the hell are you doing CG in the first place? There aren't many jobs in the world that are creative and fun to do, but this is one of them. Keeping that in mind keeps you honest and sane.

"There aren't many jobs in the world that are creative and fun to do, but this is one of them. Keeping that in mind keeps you honest and sane"



The particle-heavy whiteout scenes placed huge stresses on Darkside's render systems

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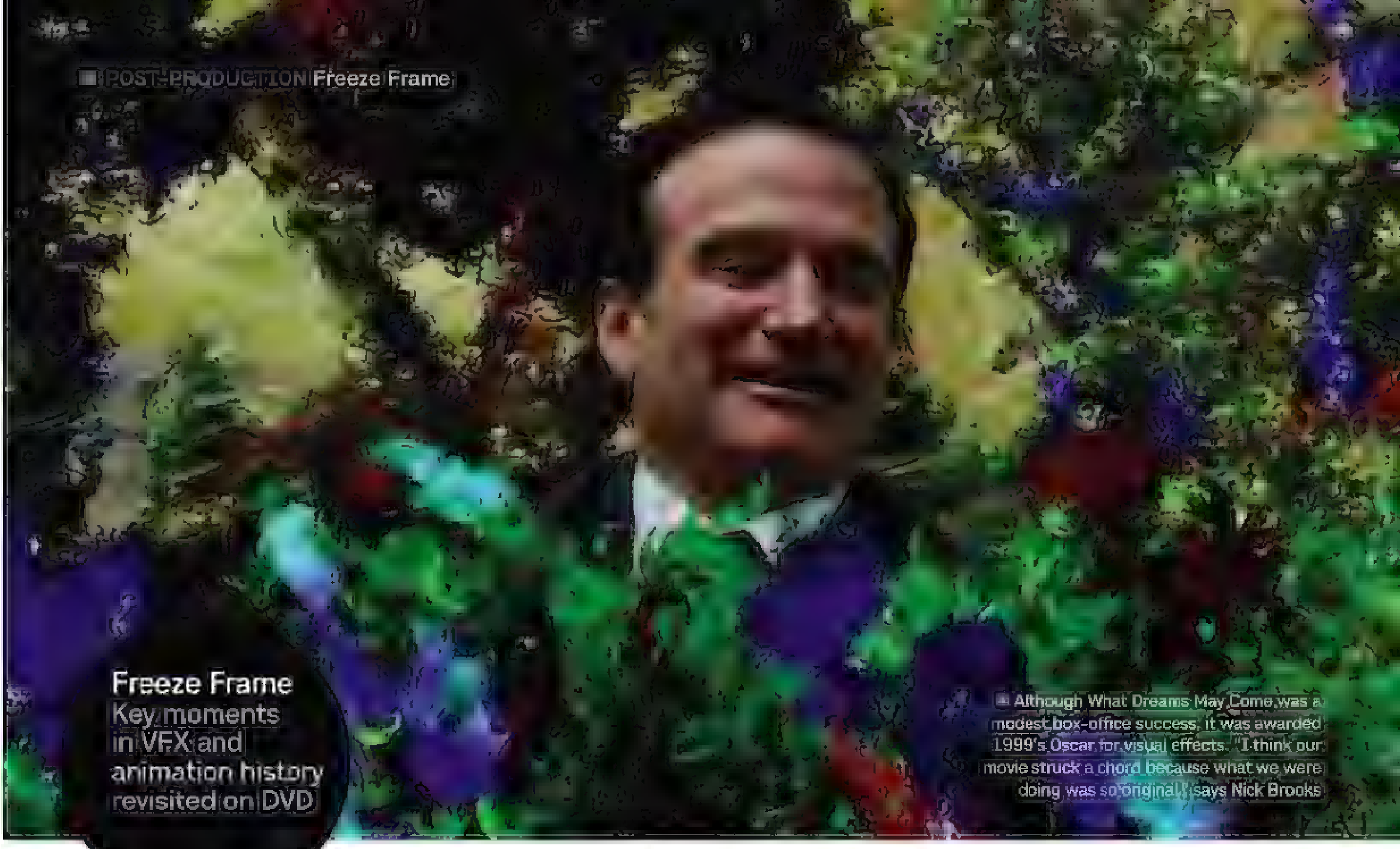
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Although What Dreams May Come was a modest box-office success, it was awarded 1999's Oscar for visual effects. "I think our movie struck a chord because what we were doing was so original," says Nick Brooks

Freeze Frame
Key moments in VFX and animation history revisited on DVD

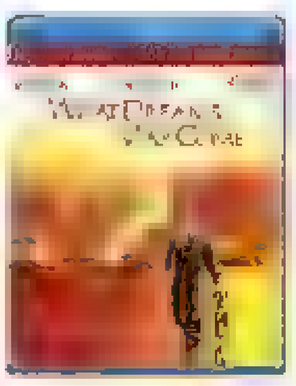
Sweet dreams

Nick Brooks and Pierre Jasmin recall Mass Illusion's stunning VFX for the afterlife drama What Dreams May Come. By Mark Ramshaw

More than a decade on, 1998's What Dreams May Come remains one of Hollywood's unlikeliest creations Based on a novel by Richard Matheson and starring Robin Williams, director Vincent Ward's blend of metaphysics and romance beguiled some moviegoers and critics and attracted scorn from others. All, however, were united in their praise for the effects, which used animated painterly techniques to bring the afterlife to the screen in a way that had never been seen before.

"I got involved right at the beginning, when Vincent Ward and Interscope were trying to find a solution for the visual challenges of the film, specifically how to create the painted afterlife world," says Nick Brooks. Now a freelance VFX supervisor, Brooks had helped set up Cinesite and been involved with the development of Cineon before becoming digital FX supervisor at Mass Illusion. "They were terrified of a full CG route, particularly given that 3D had a little way to go before photorealism was achievable."

Mass Illusion had been researching new techniques, including various procedures for reality capture. "My job was to make it possible to capture a whole scene when we shot film, using techniques including Lidar and optical flow image analysis," says Brooks. "My partner in crime was John Gaeta, and at the same time we were also developing Bullet Time. It might not immediately look like it, but there are technologies shared by the two techniques."



VITAL STATISTICS
Title What Dreams May Come
Formats Blu-ray/DVD
Blu-ray release
US 3 May 2011
UK TBC
Distributor
PCA (UK) and Polygram (US) for original DVD release. Universal (US) for Blu-ray
Watch for Robin Williams' character Chris taking a dip in a lake composed of liquid paint

Making an impression

Brooks says that the director shot scenes to be as representative as possible, filming in a forest landscape in low light. "Then we were allowed to retreat into our studio and pound on it until we got something working. The only thing Vincent was clear about was the artistic influences he wanted us to reference. He talked about Caspar David Friedrich, Monet and Van Gogh: this led to a look we termed the 'resurrection landscape', with the sun always low in the frame like at pre-dawn, to give a sense that the world was coming alive."

At this point, Pierre Jasmin joined the team. One of the original programmers of Flame at Discreet Logic, Jasmin had been working on his own Motion Paint system when the opportunity to get more involved with film production came up. "At that point Canada didn't get many big-budget movies, and the project was attractive," he says. "Then there was the way Mass Illusion was set up. It had been built over the old Doug Trumbull facility, with a motion control stage, prop workshops and so on, rather than just a studio with people sat at computers."

Jasmin recalls reworking his code for the project, creating a multi-stage pipeline that would make the motion painting process as efficient as possible: "Every step required so much computation that we broke it into steps. There was an automatic batch-processing step for the optical flow, then an interactive set-up pass for the artists, and another automated system to send it all to the render farm. It used to take over an hour just for the optical flow calculations on one frame. Nowadays it would require a third of a second."

The first step was to develop a two-shot proof of concept test, which was used to get Robin Williams onboard and the movie greenlit. Unfortunately things became more convoluted during post production, with Mass Illusion going bankrupt as a result of budget overruns on another movie. The Dreams team of 30 animators and nine compositors were kept together under the new name Mass Illusions to complete the pivotal eight minute painted world sequence, but everything else was pulled, with studios including Digital Domain and Pacific Ocean Post stepping in to take over other visual effects.

Organic setting

These problems aside, Jasmin says the development of the painted world shots

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KEY TECHNOLOGY

For the different painting styles, Nick developed to achieve the final resurrection landscape seen in What Dreams May Come, with key influences provided by the works of Caspar David Friedrich and other 19th-century Romantics, as well as Monet and Van Gogh. "We used a hybridised approach for paint generation, with two image-based animation systems and a fully 3D one," says Nick Brooks, the film's VFX supervisor. "To start with, colour and movement were obviously key, and then we got into an area of segmentation, dividing the scene up in terms of materials, like water, rock, bushes and foreground elements."

The next critical thing was depth. One of the industry struggled with then was tracking, so we got a rough camera match with 3D Equaliser, then used Lidar to get a point cloud of the scene. We'd use optical flow, geological survey data and the point cloud to deform our geometry onto the photography, ready for the addition of paint strokes and the integration of CG elements, including procedurally generated flowers and lakes."

While automated tracking techniques were employed, the artists also had to manually deconstruct each shot to access the motion of objects, including plants blowing in the wind, character interactions and even waves on the lake





Original and final footage of a sequence. In addition to shooting in a live environment as close as possible to the desired final look of the painted world, the filmmakers also adjusted the colour saturation to give the artists a closer match

"Every capture process was flawed in some way. That turned it from a way of recording a scene to creating a hallucinatory reality"

Nick Brooks, VFX supervisor

proved highly creatively rewarding for the Mass Illusion artists. "Once they saw our initial examples, it became quite clear to the artists how to use it. We'd hired a lot of technical director types, which helped."

Brooks believes the film marked the first time a studio had attempted to produce an organic digital environment. "Of course we based everything on photography, but what I liked about the approach is that every capture process was flawed in some way. That turned it from a way of recording a scene to an interpretation, helping us to create a sort of hallucinatory reality. It's the same with Bullet Time. It's not absolutely perfect, and the human brain knows that something is not quite right, which pushes it into a world of imagined reality."

"The movie was such a struggle, but I'm very proud of what we achieved and of the team that worked on it," says Brooks. "They were transformed, becoming painters of moving images... it was an incredible artistic experience for everyone involved. It wasn't just about making something photoreal fit into a scene, and it wasn't a simple forgery job. The illusion we were creating was a magical one."

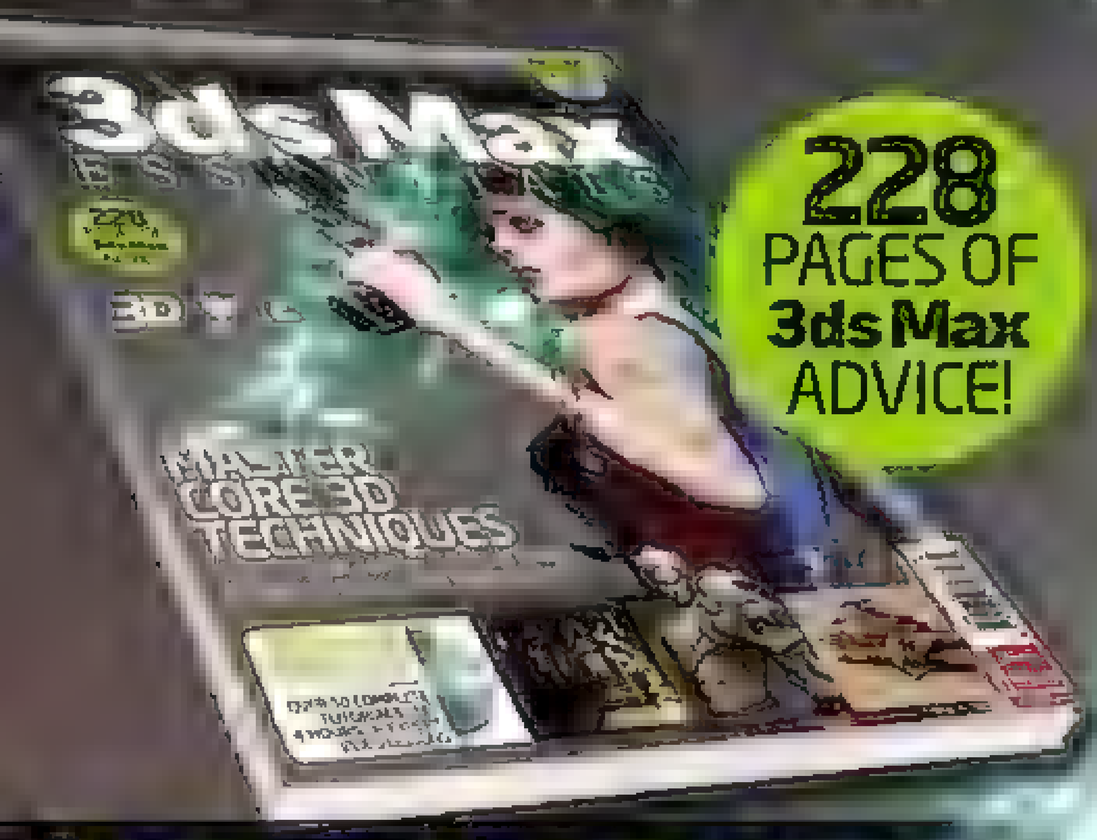


Pazierre Jasmin went on to form RE: Vision Effects with Motion Pa nt co-developer Pete Litwinowicz. One of the products they developed was Video Gogh: "It's like a canned version of the original tool, to enable people to add the same sort of look to their videos," explains Jasmin

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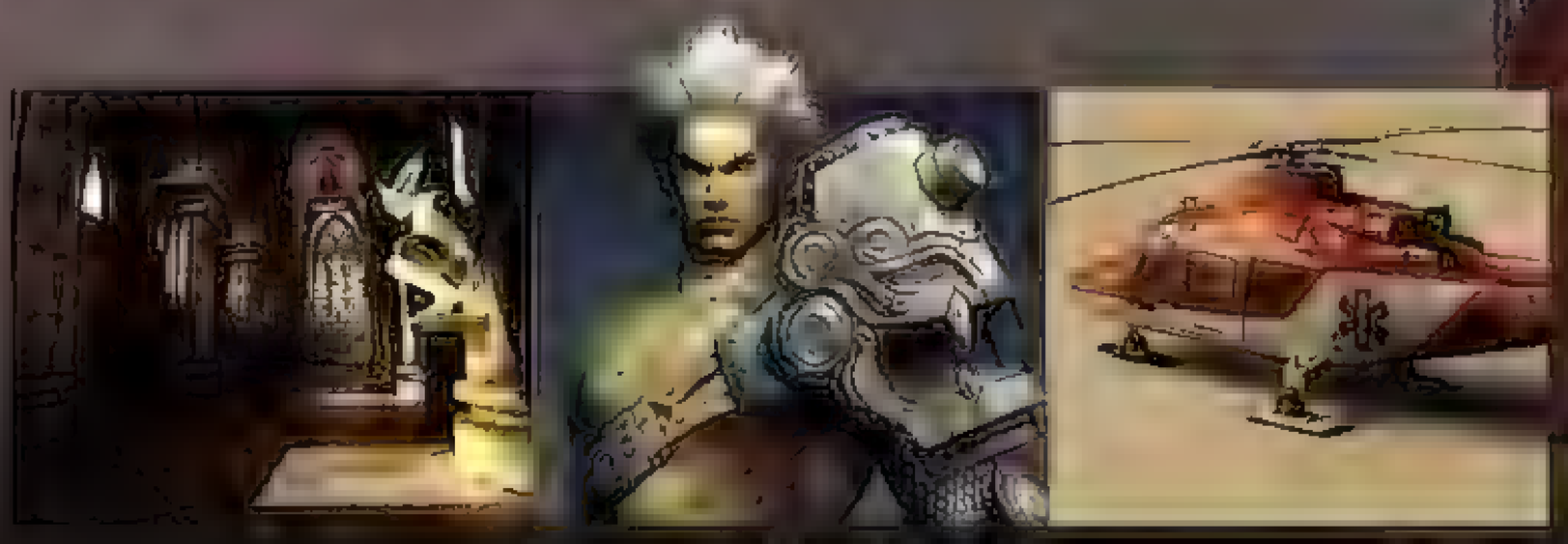
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My Inspiration
Industry legends reflect on the work that shaped their lives in 3D

Stanley Kubrick was awarded an Oscar for his visual effects work on 2001 rather than his direction. Techniques included front-projection photography and a giant centrifuge set





Lost in space

Co-owner of Look Effects **Max Ivins** reveals how a pivotal early movie experience lead him to a career in VFX

When I was seven years old, I went to a movie theatre in Claremont to see Stanley Kubrick's 2001: a Space Odyssey. It was the first film experience that left me awestruck. Its depiction of man's exploration of space and sophisticated computer intelligence is the earliest inspiration that led me to my career in visual effects.

The feeling of wonder and excitement from being transported into a futuristic world is one of my more vivid childhood memories. It was my first big exposure to science fiction, and I was blown away. The excavation on the moon, the spaceships and stations and the HAL 9000 computer are just some of the futuristic and now iconic – scenes that left a deep impression on me. It was the beginning of a lifelong appreciation of science, and of science fiction in books and film.

The sophistication and realism in the design was amazing. The enigmatic mystery of the monolith was a great vehicle to lift my wonder and amazement to all time highs. To this day, I am inspired by the quality of the design and implementation of the visual effects; I am always impressed how the film holds up 40-plus years after its release.

The one effect that sticks in my head when I think back on the film is shot on the space station, where the stewardess walks around the intersection ring from horizontal to vertical. The shot relied on a gimbal set: not the most complicated effect, but it has stuck in my mind all these years on.

There are other inspirational films along the way that have influenced and inspired me, but 2001 was the first. It was the genesis of a path that led me to VFX. It has influenced my design of effects, most consciously the timing or pacing. I tend towards a pacing that is more deliberate, giving time for the effect to develop, to hit the beats and be absorbed by the viewer. Let the mystery unfold, so to speak. This is a definite style influenced by 2001. I also feel that the level of quality in the film is something I admire and strive to apply to all areas of my work. ●



About the author
Max Ivins is a senior visual effects supervisor at Look Effects. During his career he has worked at various facilities including Digital Domain and has worked on films such as Transformers: Revenge of the Fallen, Avatar and CSI:NY.
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Thor patch

Is it a bird? Is it a plane? No, it's the Incredible Roy, and he's had a gutful of superheroes, mindless spectacle and franchise crossovers

Much as I don't want to rain on Marvel's parade or anything, isn't there just a glimmer of the tiniest chance that they've been getting a bit carried away of late? Oh, I know, we all love the reassurance of a good caped crusader tale in times of global uncertainty. But: seven superhero films currently in production? Really?

This current bout of endearing, yet at the same time unnerving, enthusiasm – a sort of corporate equivalent to Tom Cruise jumping up and down on Oprah's sofa in a bid to demonstrate how normal he is – is perhaps understandable. Stan Lee and his henchmen have been witness to so many half-cocked, lazy-arsed movie versions of their comic books over the years, it's only natural the merest whiff of box office success would send them into an empire-building frenzy.

Just imagine how you'd feel if you'd become one of two titans of the comic book market, rolling out one successful superhero after another, only to watch in dismay as Hollywood grabbed the rights to your characters and then went off and balsed things up time and again. Anybody remember those 1970s films cobbled together from bits of shonky TV shows like The Amazing Spider-Man and The Incredible Hulk? How about that senseless straight to DVD Captain America? Or maybe Roger Corman's no-budget 1994 take on The Fantastic Four? Unlikely: it was never even released. (Just how bad does a movie have to be for Hollywood to do that? And why weren't the same rules applied to Sex And The City 2?)

Little wonder that, after the unexpected success of Blade and the subsequent money-spinning antics of Spider-Man and the X-Men, Marvel decided to bring movie production in-house, and kick off its current love affair with the whole 'synergy' thing. In theory, it's a pretty smart move. There's something genuinely thrilling about the idea of crossover between all these superhero movies to bring them together in one coherent world – a cameo from Iron Man in a Hulk movie here, a Captain America shield briefly popping up in an Iron Man movie there – with the intention of bringing all the crime-fighting heavy hitters together for an explosive Avengers movie in 2012. But even my absinthe-addled brain can spot a serious flaw in the whole plan.

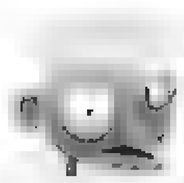
By cross-linking all these films, Marvel has built itself a house of cards. If just one movie turns out to be well, crap, or even if it simply underperforms at the box office – because the general public just can't warm to a hammer-wielding Viking god getting cast out of Asgard and winding up like some sort of steroid-enhanced, golden-tressed lumberjack in Middle America, for example – then the whole enterprise is liable to collapse. One stinker will taint the entire franchise.

Making lantern-jawed saviours suitable for mass consumption is a pretty tricky business (as Marvel should know only too well). Talk a load of poppycock about Nietzsche, the id, and the psychology of hero worship all you like: sometimes a man in a spandex suit is just a man in a spandex suit (thanks, Freud), and that doesn't half look silly in the cold light of day.

Getting grown men and women into cinemas to watch people act out childish crime-fighting fantasies requires three things, the right tone, a charismatic lead and a whole shitload of spectacle. Let's be honest: nobody went to see Iron Man because they couldn't get enough of the original comic book. They went to see Robert Downey Jnr drown the rest of the cast in sleazy charm and to watch ILM make things fly. Then blow up.

Speaking as a professional, I'm all for Hollywood's over-reliance on the visual effects industry. If everybody starts aping Bergman and Allen, we're all screwed. But as a moviegoer, I'm not sure how many more blockbusters trying to disguise a complete lack of content by throwing visual effects at the screen as if they're confetti I can stomach. Much as I'm hoping Marvel does succeed, you only have to look at the last two Fantastic Four movies to see what happens when you try to prop up a superhero flick with nothing but digital trickery and lame sight gags.

At least the Marvel men can console themselves in the fact that arch-rivals DC are on similarly shaky ground, they've handed the keys to the Superman kingdom to Zack 'quick-quick slow' Snyder, and decided the best way to celebrate Christopher Nolan's pitch-perfect resurrection of Batman is to throw away the entire legacy after the next movie and start again from scratch. Smart move, guys. Still, that that's got to guarantee more work for us button-pushers. The nipples on that batsuit don't digitally enhance themselves, you know...



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